FCC PART 15 SUBPART C TEST REPORT

FCC PART 15 SUBPART E 15.407

Report Reference No.....:	**MAX25010076P01-R01**
FCC ID..... :	**2BNUS-AOV590**
Compiled by (position+printed name+signature)..:	Engineer/ Cindy Zheng Cindy zheng
Supervised by (position+printed name+signature)..:	Manager/Haley Wen Haley wen
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Date of issue.....:	February 20, 2025
Testing Laboratory Name.....:	**MAXLAB Testing Co.,Ltd.**
Address..... :	1/F, Building B, Xinshidai GR Park,Shiyan Street, Bao'an District, Shenzhen,Guangdong, 518052, People's Republic of China
Applicant's name.....:	**Shenzhen Xiaobaotiantian technology Co., LTD**
Address..... :	501, Building 1, No. 48, Kangzheng Road, Danzhutou Community, Nanwan Street, Longgang District, Shenzhen
Test specification.....:	
Standard.....:	**FCC CFR Title 47 Part 15 Subpart C Section 15.407** **ANSI C63.10:2020** **KDB 789033 D02 v02r01** **KDB353028 D01v01r01** **KDB662911 D01 v02r01**

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Test item description.....:	**Tower Computer**
Trade Mark.....:	abytespark
Manufacturer.....:	Shenzhen Xiaobaotiantian technology Co., LTDogy Co.,Ltd
Model/Type reference.....:	AOV590
Listed Models .....:	AOV580, AOV7304G, AOV750TI, AOV9604G, AOV1050TI, AOV10606G, AOV2060, AOV4060/AOV10304G
Modulation Type..... :	OFDM
Operation Frequency..... :	From 5180MHz-5240MHz, 5745MHz-5825MHz
Rating.....:	AC120V
Result.....:	**PASS**

TEST REPORT

Equipment under Test	:	**Tower Computer**
Model /Type	:	AOV590
Series Model No.		AOV580, AOV7304G, AOV750TI, AOV9604G, AOV1050TI, AOV10606G, AOV2060, AOV4060/AOV10304G
Model Declaration	:	All the models are electrical identical including the same software parameter and hardware design, same mechanical structure and design, the only difference is the model named different.
Applicant	:	**Shenzhen Xiaobaotiantian technology Co., LTD**
Address	:	501, Building 1, No. 48, Kangzheng Road, Danzhutou Community, Nanwan Street, Longgang District, Shenzhen
Manufacturer	:	**Shenzhen Xiaobaotiantian technology Co., LTD**
Address	:	501, Building 1, No. 48, Kangzheng Road, Danzhutou Community, Nanwan Street, Longgang District, Shenzhen

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

CC Rules Part 15 Subpart E—Unlicensed National Information Infrastructure Devices
ANSI C63.10-2020: American National Standard for Testing Unlicensed Wireless Devices
KDB789033 D02: General UNII Test Procedures New Rules v02r01
KDB353028 D01v01r01 : BASIC EQUIPMENT AUTHORIZATION GUIDANCE FOR ANTENNAS USED WITH PART 15 INTENTIONAL RADIATORS
KDB662911 D01v02r01 : Multiple Transmitter Output v02r01

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	February 7, 2025
Testing commenced on	:	February 7, 2025
Testing concluded on	:	February 20, 2025

2.2 Product Description

Product Name:	Tower Computer			
Model/Type reference:	AOV590			
Power supply:	AC120V			
Adapter information	/			
testing sample ID:	MAX25010076P01-R01-1# (Engineer sample), MAX25010076P01-R02-2# (Normal sample)			
Hardware version:	V1.0			
Software version:	V1.0			
WIFI :				
Supported type:	20MHz system	40MHz system	80MHz system	160MHz system
	802.11a 802.11n 802.11ac	802.11n 802.11ac	802.11ac	N/A
Modulation:	5180MHz-5240MHz 5745MHz-5825MHz	5190MHz-5230MHz 5755MHz-5795MHz	5210MHz 5775MHz	N/A
Operation frequency:	OFDM	OFDM	OFDM	N/A
Channel number:	9	4	2	N/A
Channel separation:	20MHz	40MHz	80MHz	N/A
Antenna type:	External antenna			
Antenna gain:	ANT A: 5 dBi ANT B: 5 dBi			
Note:	The 5GHz WIFI has 2 antennas and support Multiple Outputs for 802.11n mode for this report; Antenna A/B Gain is 5dBi; For this function is belong to Correlated Categorization equipment According to KDB 662911, for same directional gain. Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi =5+10log(2) dBi=8.01dBi			

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	●	120V / 60Hz
		○	12 V DC	○	24 V DC
		○	Other (specified in blank below)		

2.4 Short description of the Equipment under Test (EUT)

This is Tower Computer.
For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

The Applicant provides communication tools software (AT command) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.
All test performed at the low, middle and high of operational frequency range of each mode.

Operation Frequency List WIFI on 5G Band：

Operating band	20MHz		40MHz		80MHz	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
U-NII 1 (5150MHz-5250MHz)	36	5180	38	5190	42	5210
	40	5200				
	44	5220	46	5230		
	48	5240				
U-NII 3 (5725MHz-5850MHz)	149	5745	151	5755	155	5775
	153	5765				
	157	5785	159	5795		
	161	5805				
	165	5825	--	--	--	--

Note: The line display in grey is those Channels/Frequencies select to test in this report for each operation mode.

2.6 Block Diagram of Test Setup

2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

MAXLAB Testing Co.,Ltd.
1/F, Building B, Xinshidai GR Park,Shiyan Street, Bao'an District, Shenzhen,Guangdong, 518052, People's Republic of China

3.2 Test Facility

FCC-Registration No.: 562200 Designation Number: CN1338
MAX Testing Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

Industry Canada Registration Number. Is: 11093A CAB identifier: CN0019
The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

A2LA-Lab Cert. No.: 4707.01
MAX Testing Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:
Radiated Emission:

Temperature:	25 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

Conducted testing：

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

AC Power Conducted Emission

Temperature:	24 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

3.4 Test Description

FCC Requirement		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.407(a)	Emission Bandwidth(26dBm Bandwidth)	PASS Note1
FCC Part 15.407(e)	Minimum Emission Bandwidth(6dBm Bandwidth)	PASS Note2
FCC Part 15.407(a)	Maximum Conducted Output Power	PASS
FCC Part 15.407(a)	Peak Power Spectral Density	PASS
FCC Part 15.407(g)	Frequency Stability	PASS
FCC Part 15.407(b)	Undesirable emission	PASS
FCC Part 15.407(b)/15.205/15.209	Radiated Emissions	PASS
15.407(b)(1)/ 15.407(b)(2) 15.407(b)(3)/ 15.407(b)(4)	Band Edge	PASS
15.407(b)	Spurious Emissions at Antenna Terminals	PASS
FCC Part 15.407(h)	Dynamic Frequency Selection	N/A Note 3
FCC Part 15.203/15.247(b)	Antenna Requirement	PASS
FCC Part 15.407(c)	Automatically discontinue transmission	PASS Note4

Note 1: Apply to U-NII 1, U-NII 2A, and U-NII 2C band.
Note 2: Apply to U-NII 3 band only.
Note 3: This device not work in DFS band.
Note 4: While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (Manufacturer declare)

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate
MMaximum Conducted Output Power Power Spectral Density Emission Bandwidth(26dBm Bandwidth) Minimum Emission Bandwidth(6dBm Bandwidth) Undesirable emission Frequency Stability	11a/OFDM	6 Mbps
	11n(20MHz),11ac(20MHz)/OFDM	7.2 Mbps
	11n(40MHz),11ac(40MHz)/OFDM	15.0Mbps
	11ac(80MHz)/OFDM	65.0Mbps

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the MAXLAB Testing Co.,Ltd.quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for MAXLAB Testing Co.,Ltd.

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6 Equipments Used during the Test

Conducted Emission					
Test Equipment	**Manufacturer**	**Model**	**Serial No.**	**Date of Cal.**	**Due Date**
Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	MAX252	2024-10-27	2025-10-26
EMI Test Receiver	R&S	ESCI 7	MAX552	2024-10-27	2025-10-26
Coaxial Switch	ANRITSU CORP	MP59B	MAX225	2024-10-27	2025-10-26
ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	MAX226	2024-10-27	2025-10-26
Coaxial Cable	MAX	N/A	MAX227	N/A	N/A
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Thermo meter	KTJ	TA328	MAX233	2024-10-27	2025-10-26
Absorbing clamp	Elektronik-Feinmechanik	MDS21	MAX229	2024-10-27	2025-10-26
LISN	R&S	ENV216	308	2024-10-27	2025-10-26
LISN	R&S	ENV216	314	2024-10-27	2025-10-26

Radiation Test equipment					
Test Equipment	**Manufacturer**	**Model**	**Serial No.**	**Date of Cal.**	**Due Date**
3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	MAX250	2024-10-27	2025-10-26
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	MAX251	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	MAX203	2024-10-27	2025-10-26
BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	MAX214	2024-10-27	2025-10-26
Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	MAX208	2024-10-27	2025-10-26
Horn Antenna	ETS-LINDGREN	3160	MAX217	2024-10-27	2025-10-26
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Amplifier (100kHz-1GHz)	HP	8347A	MAX204	2024-10-27	2025-10-26
Amplifier (1GHz-40GHz)	HP	84722A	MAX206	2024-10-27	2025-10-26
RF cables1 (9kHz-30MHz)	MAX	9kHz-30MHz	MAX213	2024-10-27	2025-10-26
RF cables2 (30MHz-1GHz)	MAX	30MHz-1GHz	MAX211	2024-10-27	2025-10-26
RF cables3 (1GHz-40GHz)	MAX	1GHz-40GHz	MAX210	2024-10-27	2025-10-26
Band filter	Amindeon	82346	MAX219	2024-10-27	2025-10-26

Power Meter	Anritsu	ML2495A	MAX540	2024-10-27	2025-10-26
Power Sensor	Anritsu	MA2411B	MAX541	2024-10-27	2025-10-26
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	MAX575	2024-10-27	2025-10-26
Splitter	Agilent	11636B	MAX237	2024-10-27	2025-10-26
Loop Antenna	ZHINAN	ZN30900A	MAX534	2024-10-27	2025-10-26
Breitband hornantenne	SCHWARZBECK	BBHA 9170	MAX579	2024-10-27	2025-10-26
Amplifier	TDK	PA-02-02	MAX574	2024-10-27	2025-10-26
Amplifier	TDK	PA-02-03	MAX576	2024-10-27	2025-10-26
Spectrum Analyzer (9kHz-40GHz)	Rohde & Schwarz	FSP	MAX-CE013	2024-10-27	2025-10-26

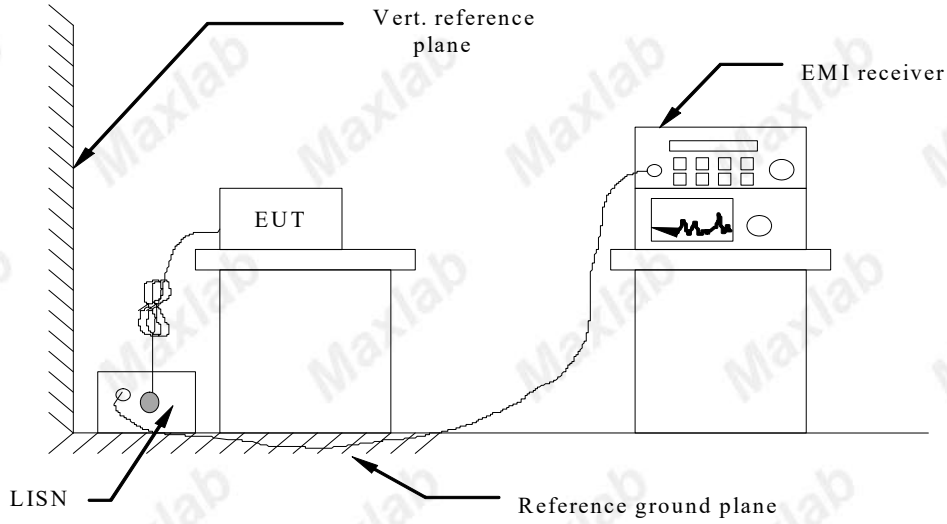
RF Conducted Test:

Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
MXA Signal Analyzer	Agilent	N9020A	MAX566	2024-10-27	2025-10-26
Spectrum Analyzer	Agilent	E4440A	MAX533	2024-10-27	2025-10-26
MXG vector Signal Generator	Agilent	N5182A	MAX567	2024-10-27	2025-10-26
ESG Analog Signal Generator	Agilent	E4428C	MAX568	2024-10-27	2025-10-26
USB RF Power Sensor	DARE	RPR3006W	MAX569	2024-10-27	2025-10-26
RF Switch Box	Shongyi	RFSW3003328	MAX571	2024-10-27	2025-10-26
Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	MAX572	2024-10-27	2025-10-26

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2020.
2 Support equipment, if needed, was placed as per ANSI C63.10-2020
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2020
4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

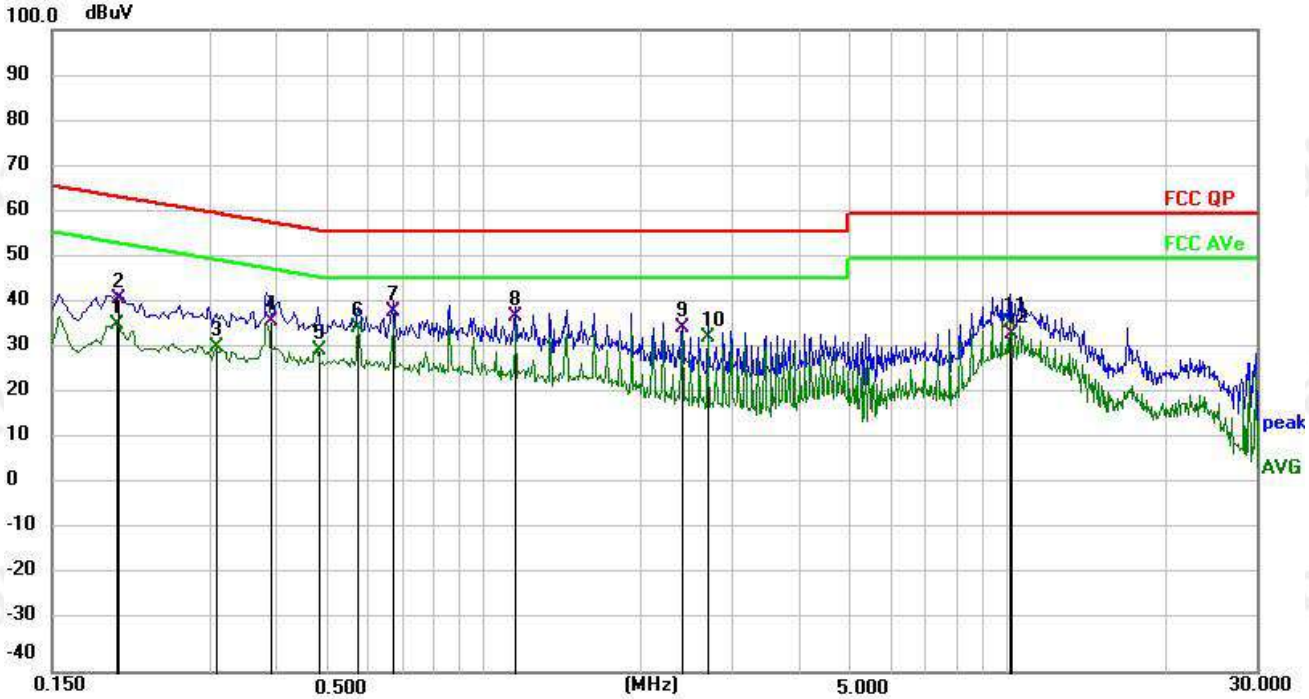
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

Note: Both ANT A and B have been test, Only show the worst data of ANT A; 802.11a/ 5180MHz and TX(5.8G) 802.11a/5745MHz modes have been tested for test, only the worst case 802.11a/ 5180MHz(ANT A) was recorded.

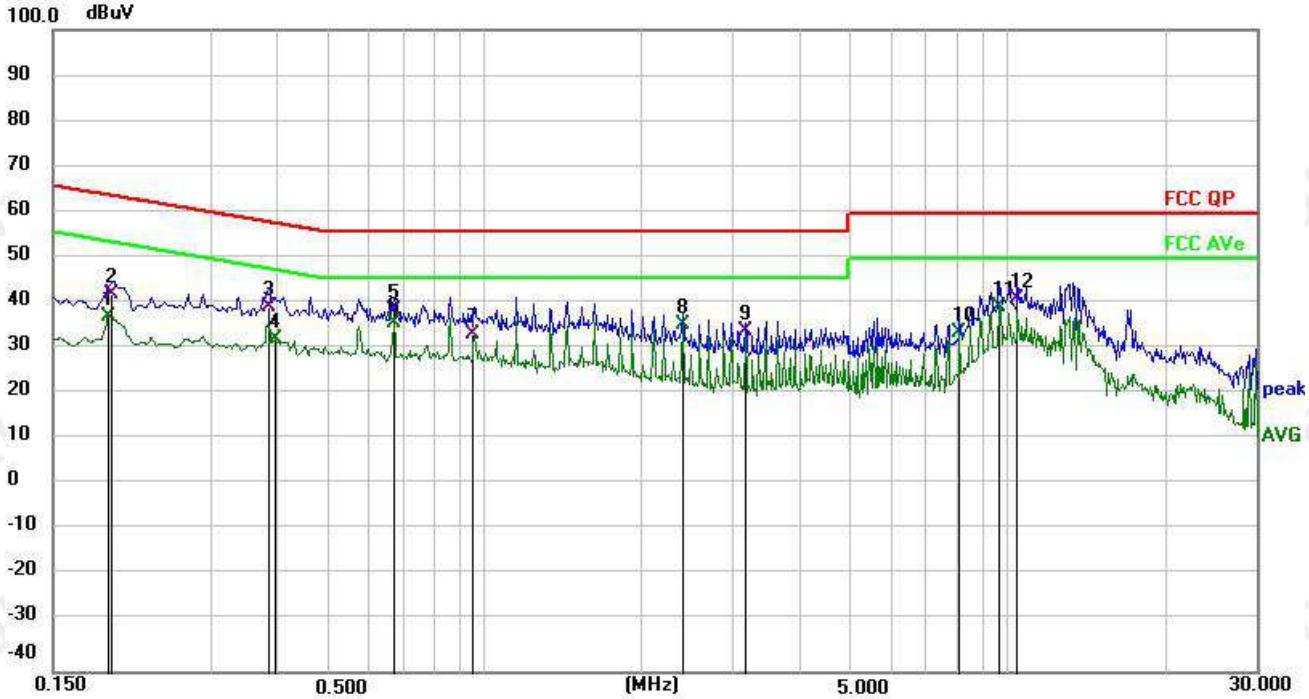
Power supply:	AC120V/60Hz	Polarization	L
Test Mode:	U-NII-1/ 802.11a/ 5180MHz / ANT A		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1995	19.13	16.73	35.86	53.63	-17.77	AVG	P	
2	0.2000	24.72	16.73	41.45	63.61	-22.16	QP	P	
3	0.3075	14.11	16.71	30.82	50.04	-19.22	AVG	P	
4	0.3919	19.77	16.70	36.47	58.02	-21.55	QP	P	
5	0.4830	13.63	16.68	30.31	46.29	-15.98	AVG	P	
6 *	0.5775	18.37	16.67	35.04	46.00	-10.96	AVG	P	
7	0.6715	21.96	16.66	38.62	56.00	-17.38	QP	P	
8	1.1534	21.04	16.60	37.64	56.00	-18.36	QP	P	
9	2.3987	18.63	16.43	35.06	56.00	-20.94	QP	P	
10	2.6880	16.67	16.39	33.06	46.00	-12.94	AVG	P	
11	10.1760	21.16	15.12	36.28	50.00	-13.72	AVG	P	
12	10.1899	18.41	15.12	33.53	60.00	-26.47	QP	P	

Note:1).Level (dBμV)= Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). Margin(dB) = Limit (dBμV) - Level (dBμV)

Power supply:	AC120V/60Hz	Polarization	N
Test Mode:	U-NII-1/ 802.11a/ 5180MHz / ANT A		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1905	19.97	17.53	37.50	54.01	-16.51	AVG	P	
2	0.1934	24.82	17.53	42.35	63.89	-21.54	QP	P	
3	0.3862	22.16	17.52	39.68	58.15	-18.47	QP	P	
4	0.3975	15.08	17.52	32.60	47.91	-15.31	AVG	P	
5	0.6716	21.49	17.51	39.00	56.00	-17.00	QP	P	
6 *	0.6720	18.61	17.51	36.12	46.00	-9.88	AVG	P	
7	0.9555	16.26	17.51	33.77	56.00	-22.23	QP	P	
8	2.4000	18.31	17.46	35.77	46.00	-10.23	AVG	P	
9	3.1689	17.04	17.44	34.48	56.00	-21.52	QP	P	
10	8.1240	17.19	16.83	34.02	50.00	-15.98	AVG	P	
11	9.7035	23.00	16.55	39.55	50.00	-10.45	AVG	P	
12	10.4815	24.96	16.40	41.36	60.00	-18.64	QP	P	

Note:1).Level (dBμV)= Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). Margin(dB) = Limit (dBμV) - Level (dBμV)

4.2 Radiated Emission

Limit

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Undesirable emission limits

Requirement	Limit(EIRP)	Limit (Field strength at 3m) Note1
15.407(b)(1)	PK:-27(dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)		

Note1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

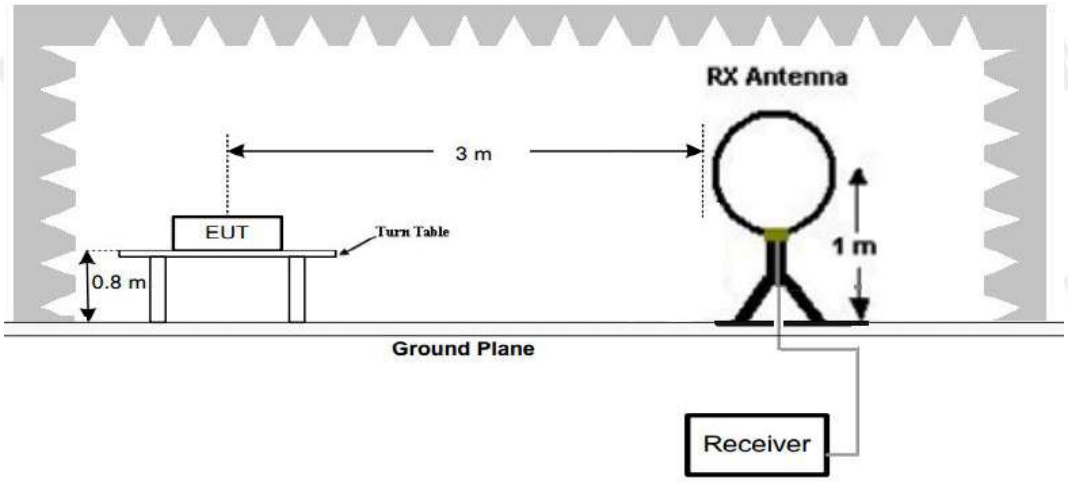
(5) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209
(6)In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

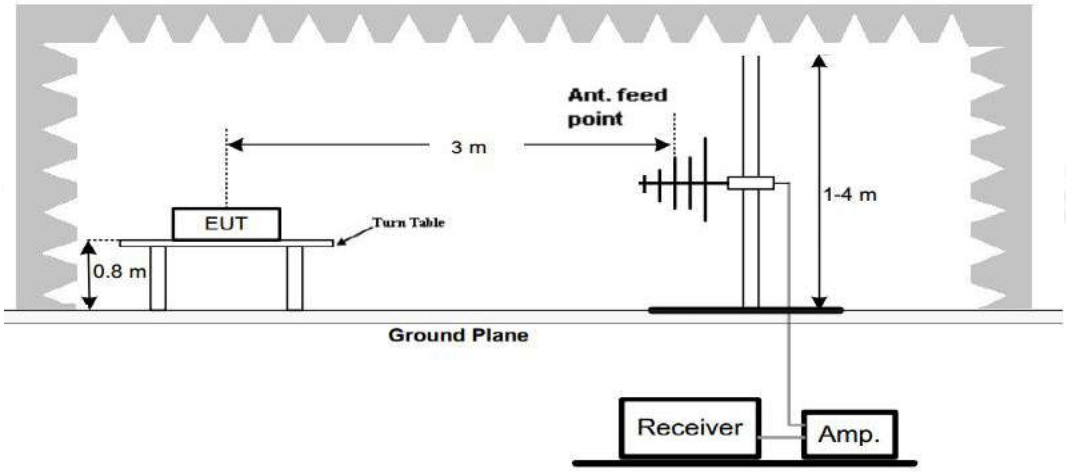
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

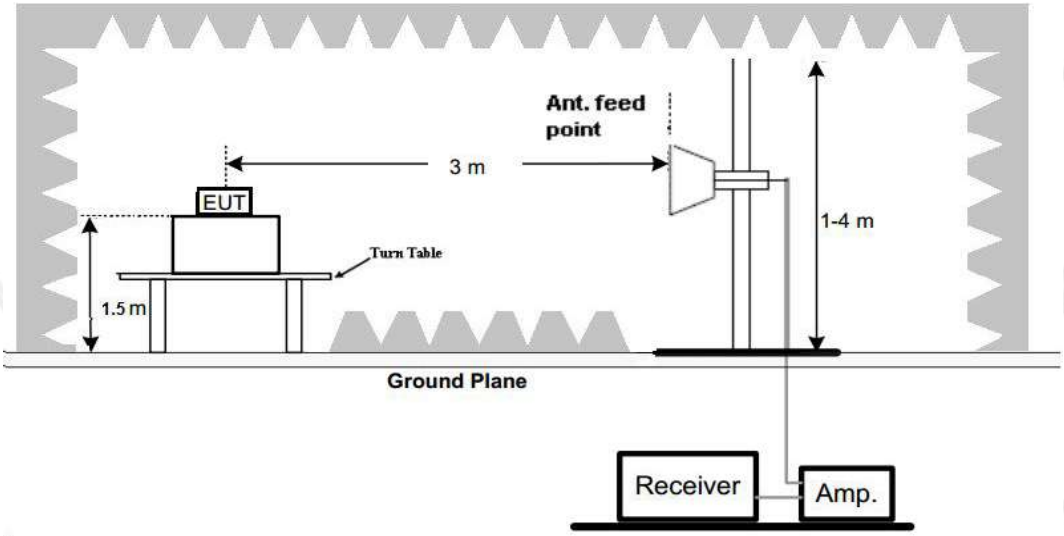
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 40GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

TEST RESULTS

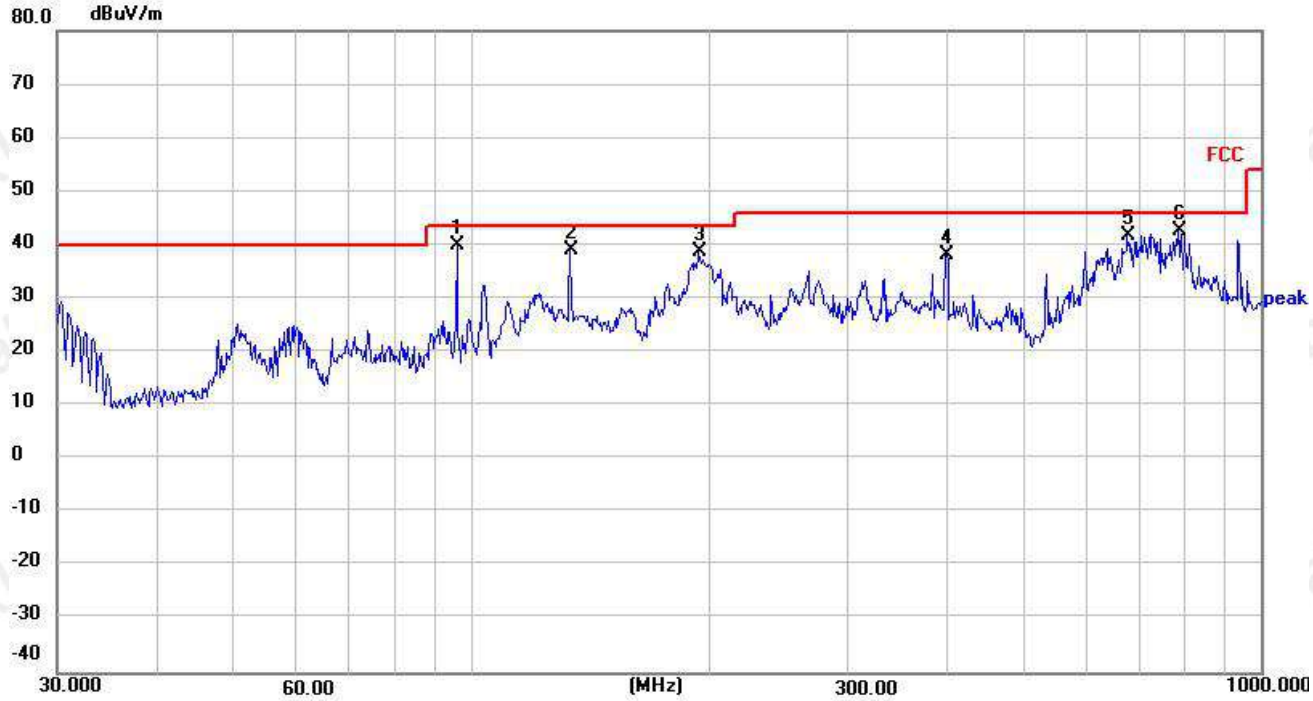
Between 9KHz – 30MHz
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

For 30MHz-1GHz

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage:	AC 120V
Test Mode:	TX(5.2G) 802.11a/5180MHz/ ANT A		

Note: Pre-scan all mode, Both ANT A and B have been test, Only show the worst data of ANT A; 802.11a/ 5180MHz and TX(5.8G) 802.11a/5745MHz modes have been tested for test, only the worst case 802.11a/ 5180MHz(ANT A) was recorded.

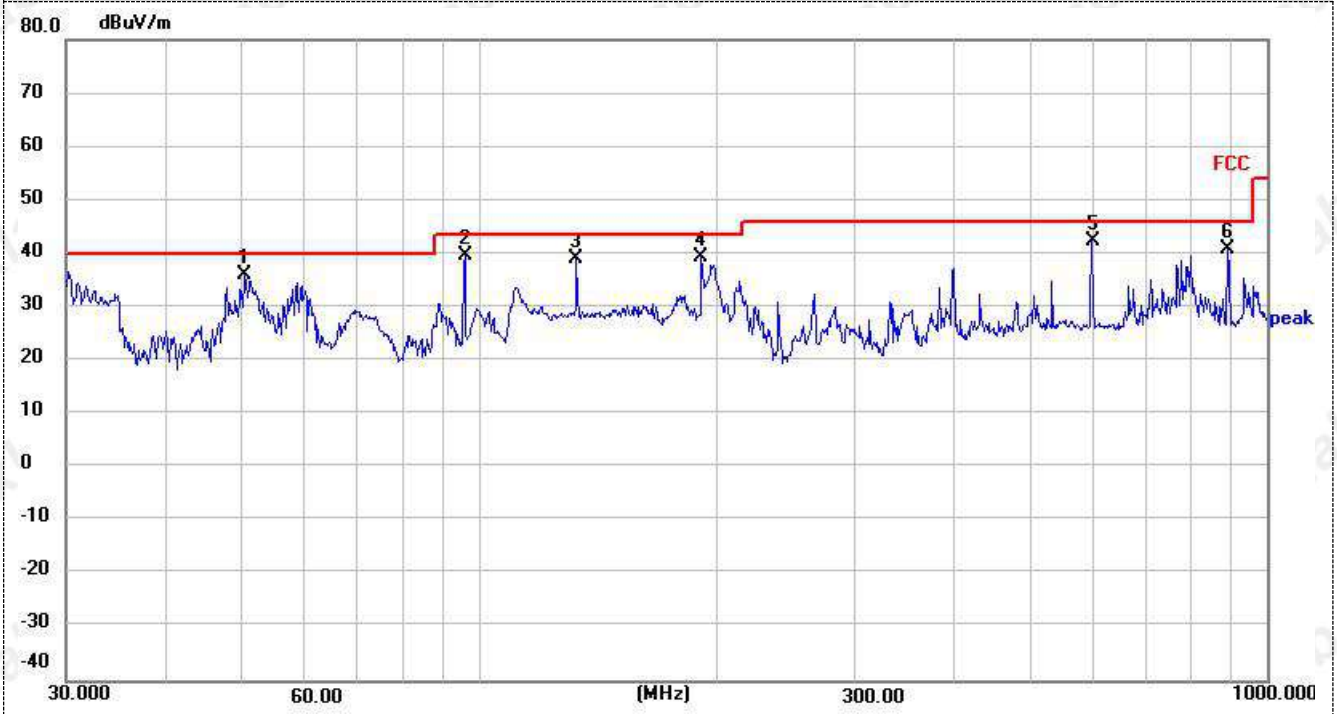
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	96.0985	60.14	-20.19	39.95	43.50	-3.55	peak	100	0	P	
2	133.6188	56.01	-17.05	38.96	43.50	-4.54	peak	100	0	P	
3	194.4534	57.77	-19.01	38.76	43.50	-4.74	peak	100	0	P	
4	399.0302	51.38	-13.12	38.26	46.00	-7.74	peak	100	0	P	
5	677.5798	48.59	-6.75	41.84	46.00	-4.16	peak	100	0	P	
6 *	785.0934	47.46	-4.82	42.64	46.00	-3.36	peak	100	0	P	

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	50.5859	52.37	-16.44	35.93	40.00	-4.07	peak	100	360	P	
2	96.0985	59.89	-20.19	39.70	43.50	-3.80	peak	100	360	P	
3	133.1510	55.99	-17.07	38.92	43.50	-4.58	peak	100	360	P	
4	191.7450	58.35	-18.85	39.50	43.50	-4.00	peak	100	360	P	
5 *	599.3212	50.15	-7.87	42.28	46.00	-3.72	peak	100	360	P	
6	890.7277	44.62	-3.86	40.76	46.00	-5.24	peak	100	360	P	

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

For 1GHz to 40GHz

Note: Both ANT A and B have been test, Only show the worst data of ANT A; All 802.11a/n/ac (HT20), 802.11n/ac (HT40) and 802.11ac (HT80) modes have been tested for above 1GHz test, only the worst case 802.11a(HT20)/ANT A was recorded.

U-NII 1 & 802.11a Mode (above 1GHz)

Tested Channel	Frequency (MHz)	Emission Limit (dBuV/m)	Detector Mode	ANT Pol	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
36 5158MHz	5150.00	53.53	PK	H	68.20	14.67	50.54	32.40	5.11	34.52	2.99
	5150.00	43.22	AV	H	54.00	10.78	40.23	32.40	5.11	34.52	2.99
	10360.00	42.57	PK	H	68.20	25.63	35.41	36.51	5.86	35.21	7.16
	--	--	--	--	--	--	--	--	--	--	--
40 5200MHz	10400.00	42.55	PK	H	68.20	25.65	35.26	36.58	5.96	35.25	7.29
	--	--	--	--	--	--	--	--	--	--	--
48 5240MHz	5350.50	43.67	PK	H	68.20	24.53	40.63	32.45	5.22	34.63	3.04
	10480.00	43.13	PK	H	68.20	25.07	35.78	36.68	6.21	35.54	7.35
	--	--	--	--	--	--	--	--	--	--	--

Tested Channel	Frequency (MHz)	Emission Limit (dBuV/m)	Detector Mode	ANT Pol	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
36 5158MHz	5150.00	53.53	PK	V	68.20	14.67	50.54	32.40	5.11	34.52	2.99
	5150.00	43.25	AV	V	54.00	10.75	40.26	32.40	5.11	34.52	2.99
	10360.00	42.38	PK	V	68.20	25.82	35.22	36.51	5.86	35.21	7.16
	--	--	--	--	--	--	--	--	--	--	--
40 5200MHz	10400.00	47.71	PK	V	68.20	20.49	40.42	36.58	5.96	35.25	7.29
	--	--	--	--	--	--	--	--	--	--	--
48 5240MHz	5350.50	48.89	PK	V	68.20	19.31	45.85	32.45	5.22	34.63	3.04
	10480.00	47.78	PK	V	68.20	20.42	40.43	36.68	6.21	35.54	7.35
	--	--	--	--	--	--	--	--	--	--	--

U-NII 3 & 802.11a Mode (above 1GHz)

Tested Channel	Frequency (MHz)	Emission Limit (dBuV/m)	Detector Mode	ANT Pol	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
149 5745MHz	5720.00	56.06	PK	H	68.20	12.14	51.26	34.21	5.11	34.52	4.80
	5720.00	51.15	AV	H	54.00	2.85	46.35	34.21	5.11	34.52	4.80
	11490.00	50.42	PK	H	68.20	17.78	41.42	38.35	5.86	35.21	9.00
	--	--	--	--	--	--	--	--	--	--	--
157 5785MHz	11570.00	45.61	PK	H	68.20	22.59	36.29	38.61	5.96	35.25	9.32
	--	--	--	--	--	--	--	--	--	--	--
165 5825MHz	5855.00	37.56	PK	H	68.20	30.64	32.41	34.56	5.22	34.63	5.15
	11650.00	36.13	PK	H	68.20	32.07	26.68	38.78	6.21	35.54	9.45
	--	--	--	--	--	--	--	--	--	--	--

Tested Channel	Frequency (MHz)	Emission Limit (dBuV/m)	Detector Mode	ANT Pol	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
149 5745MHz	5720.00	55.06	PK	V	68.20	13.14	50.26	34.21	5.11	34.52	4.80
	5720.00	50.43	AV	V	54.00	3.57	45.63	34.21	5.11	34.52	4.80
	11490.00	49.25	PK	V	68.20	18.95	40.25	38.35	5.86	35.21	9.00
	--	--	--	--	--	--	--	--	--	--	--
157 5785MHz	11570.00	44.78	PK	V	68.20	23.42	35.46	38.61	5.96	35.25	9.32
	--	--	--	--	--	--	--	--	--	--	--
165 5825MHz	5855.00	36.00	PK	V	68.20	32.20	30.85	34.56	5.22	34.63	5.15
	11650.00	35.80	PK	V	68.20	32.40	26.35	38.78	6.21	35.54	9.45
	--	--	--	--	--	--	--	--	--	--	--

REMARKS:
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the other emission levels were very low against the limit.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
6. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20 ,IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;

4.3 Maximum Peak Conducted Output Power

Limit

For the band 5.15-5.25 GHz.
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration

Test Results

U-NII 1

Type	Channel	Output power ANT A (dBm)	Output power ANT B (dBm)	Total Power PK ANT A+ANT B (dBm)	Limit (dBm)	Result
802.11a	36	10.562	6.251	/	24.00	Pass
	40	10.352	6.215	/		
	48	10.241	6.032	/		
802.11n (HT20)	36	9.263	5.621	10.823	21.99	Pass
	40	9.124	5.214	10.605		
	48	9.024	5.026	10.480		
802.11n (HT40)	38	7.652	4.251	9.287		Pass
	46	7.562	4.124	9.185		
802.11ac (HT20)	36	8.265	4.865	9.900		Pass
	40	8.144	4.635	9.745		
	48	8.214	4.234	9.675		
802.11ac (HT40)	38	5.632	1.896	7.164		Pass
	46	5.241	1.563	6.791		
802.11ac (HT80)	42	5.134	1.241	6.620		Pass

Note:
1. Measured output power at difference data rate for each mode and recorded worst case for each mode.
2. Test results including cable loss.
3. Antenna A gain: 5.0 dBi, Antenna B gain: 5.0 dBi, Directional gain=[Gain ANT +10 log(N) dBi]=8.01dbi>6dbi
Limit=24-(8.01-6)=21.99 dbi

U-NII 3

Type	Channel	Output power ANT A (dBm)	Output power ANT B (dBm)	Total Power PK ANT A+ANT B (dBm)	Limit (dBm)	Result
802.11a	149	8.562	4.652	/	30.00	Pass
	157	8.452	4.534	/		
	165	8.234	4.235	/		
802.11n(HT 20)	149	6.265	3.562	8.131	27.99	Pass
	157	6.124	3.421	7.990		
	165	6.024	3.265	7.870		
802.11n(HT 40)	151	4.262	1.562	6.129		Pass
	159	4.124	1.423	5.990		
802.11ac(HT20)	149	5.635	2.426	7.331		Pass
	157	5.235	2.354	7.039		
	165	5.241	2.269	7.015		
802.11ac(HT40)	151	2.211	-1.235	3.831		Pass
	159	2.124	-1.265	3.762		
802.11ac(HT80)	155	2.054	-1.865	3.533		Pass

Note:
1.Measured output power at difference data rate for each mode and recorded worst case for each mode.
2.Test results including cable loss.
3. Antenna A gain: 5.0 dBi, Antenna B gain: 5.0 dBi, Directional gain=[Gain ANT +10 log(N) dBi]=8.01dbi>6dbi
Limit=30-(8.01-6)=27.99 dbi

4.4 Power Spectral Density

Limit

(1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. [note1, note2]

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 1MHz for U-NII 1, U-NII 2A, U-NII C band and 510KHz for U-NII 3 band.
3. Set the VBW ≥ 3× RBW.
4. Set the span to encompass the entire EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

Test Configuration

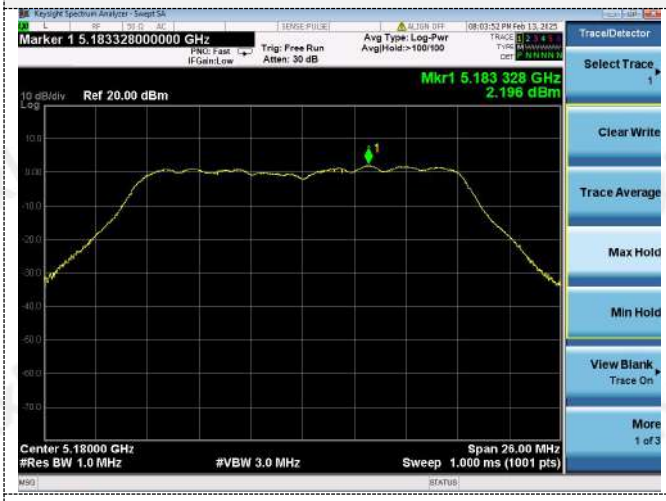
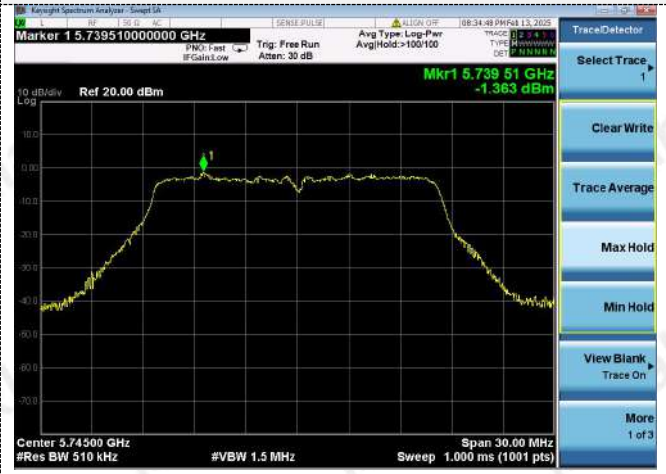
Test Results

Type	Bands	Channel	Power Spectral Density			Limit (dBm/MHz)	Result
			ANT A (dBm/MHz)	ANT B (dBm/MHz)	Total ANT A+B (dBm/MHz)		
802.11a	U-NII 1	36	2.196	0.268	/	11	Pass
		40	2.825	0.423	/		
		48	3.279	0.836	/		
802.11n (HT20)	U-NII 1	36	0.926	-1.459	2.906	8.99	
		40	1.349	-0.794	3.419		
		48	1.820	-0.166	3.950		
802.11n (HT40)	U-NII 1	38	-2.883	-5.083	-0.835		
		46	-1.424	-3.255	0.767		
802.11ac (HT20)	U-NII 1	36	-0.536	-2.411	1.637		
		40	0.444	-2.036	2.389		
		48	1.113	-1.692	2.943		
802.11ac (HT40)	U-NII 1	38	-4.308	-5.822	-1.989		
		46	-3.567	-5.841	-1.547		
802.11ac (HT80)	U-NII 1	42	-5.656	-7.817	-3.593		

Type	Bands	Channel	Power Spectral Density			Limit (dBm/500KHz)	Result
			ANT A (dBm/500KHz)	ANT B (dBm/500KHz)	Total ANT A+B (dBm/500KHz)		
802.11a	U-NII 3	149	-1.363	-3.652	/	30	Pass
		157	-1.512	-4.023	/		
		165	-0.616	-3.251	/		
802.11n (HT20)	U-NII 3	149	-1.804	-3.986	0.251	27.99	
		157	-2.111	-4.533	-0.145		
		165	-1.607	-3.507	0.556		
802.11n (HT40)	U-NII 3	151	-4.829	-7.522	-2.960		
		159	-5.612	-8.490	-3.807		
802.11ac (HT20)	U-NII 3	149	-3.037	-5.754	-1.176		
		157	-3.847	-5.846	-1.722		
		165	-3.190	-5.311	-1.112		
802.11ac (HT40)	U-NII 3	151	-7.205	-9.053	-5.021		
		159	-7.522	-9.700	-5.466		
802.11ac (HT80)	U-NII 3	155	-7.123	-9.038	-4.965		

Note:
Antenna A gain: 5.0 dBi, Antenna B gain: 5.0 dBi,Directional gain=[Gain ANT +10 log(N) dBi]=8.01dbi>6dbi
Limit=11-(8.01-6)=8.99 dbi Limit=30-(8.01-6)=27.99 dbi

Test plot as follows:
ANT A

802.11a	
U-NII 1	U-NII 3
	
CH36	CH149
CH40	CH157
CH48	CH165

802.11n(HT20)

U-NII 1

U-NII 3

CH36

CH149

CH40

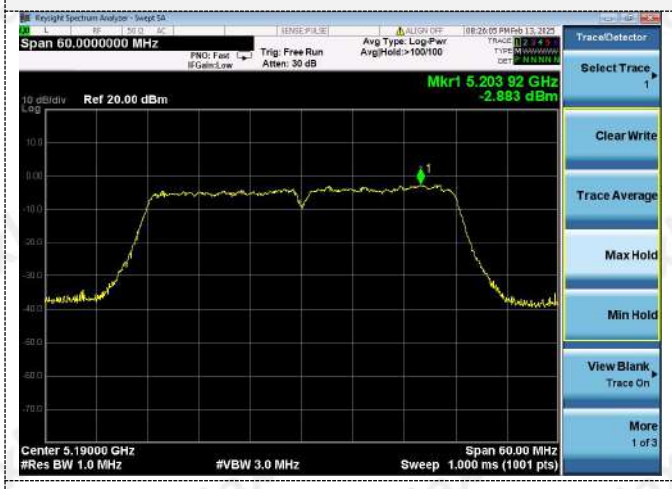
CH157

CH48

CH165

802.11n(HT40)

U-NII 1

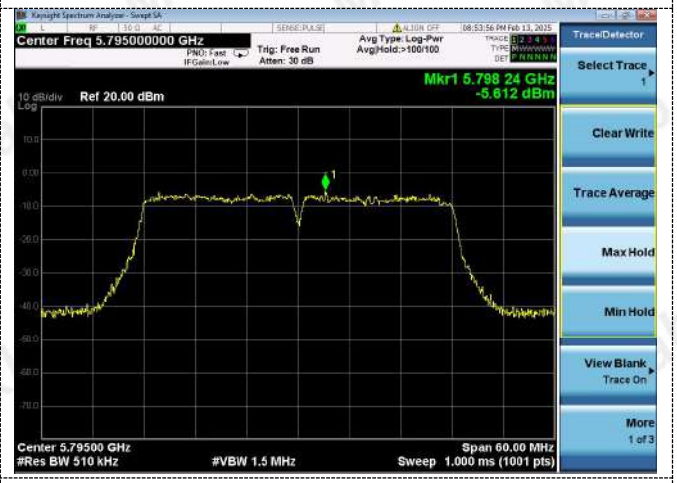


CH38

U-NII 3

CH151

CH46



CH159

802.11ac(HT20)

U-NII 1

CH36

CH40

CH48

U-NII 3

CH149

CH157

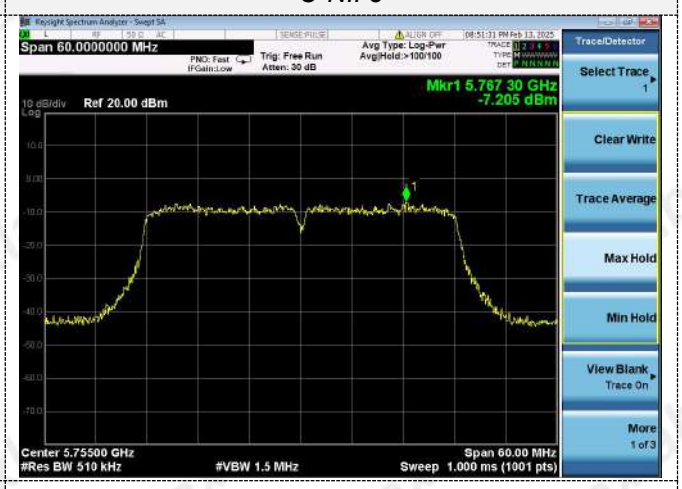
CH165

802.11ac(HT40)

U-NII 1

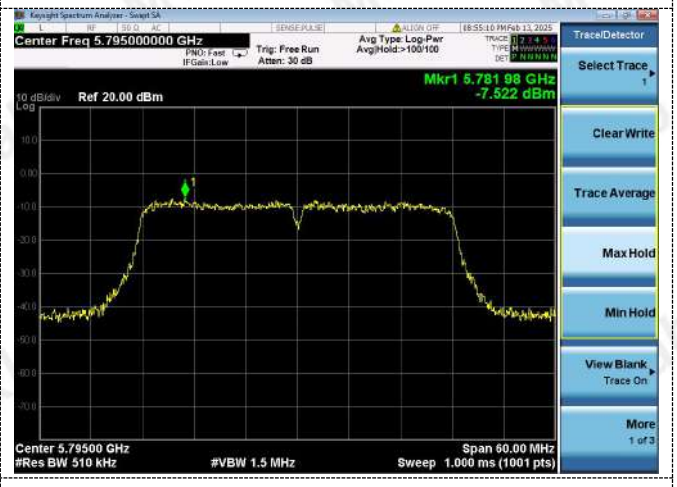
CH38

U-NII 3



CH151

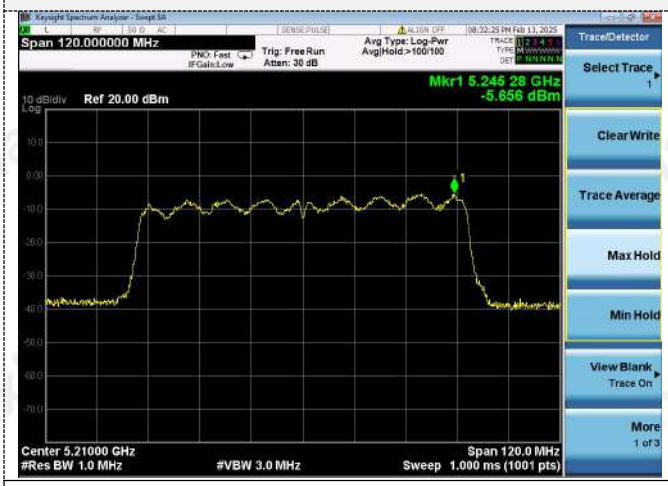
CH46



CH159

802.11ac(HT80)

U-NII 1



CH42

U-NII 3

CH155

ANT B

802.11a

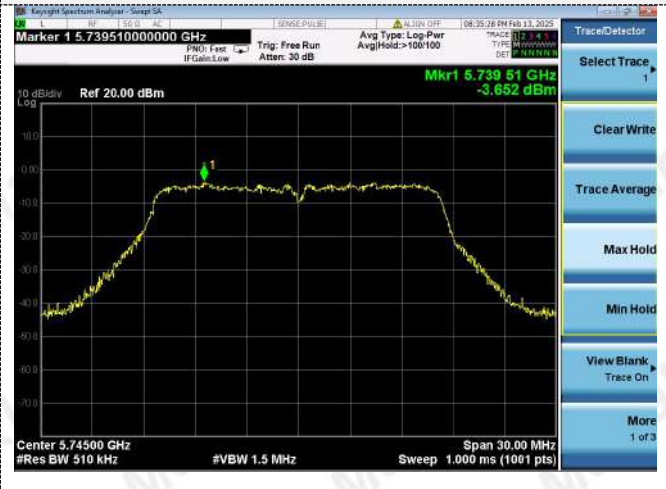
U-NII 1

CH36

CH40

CH48

U-NII 3



CH149

CH157

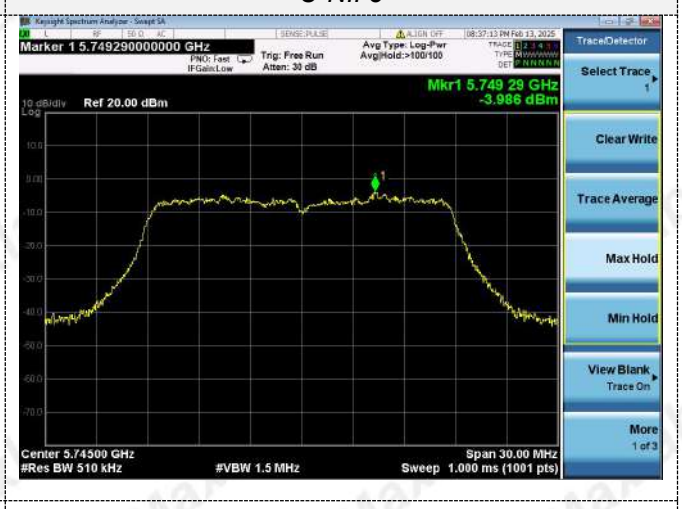
CH165

802.11n(HT20)

U-NII 1

CH36

U-NII 3



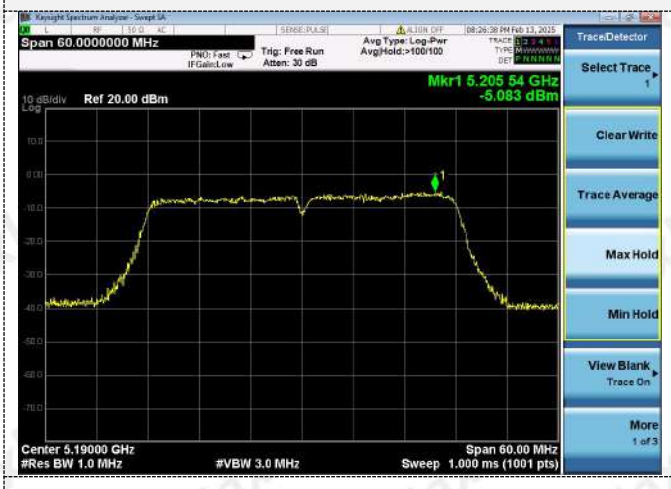
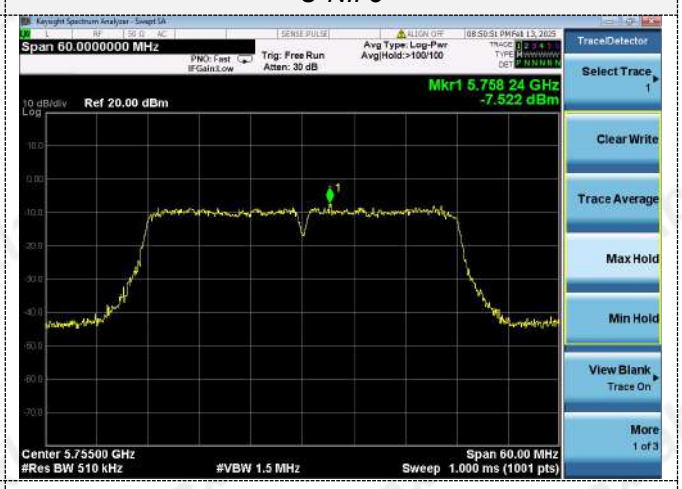
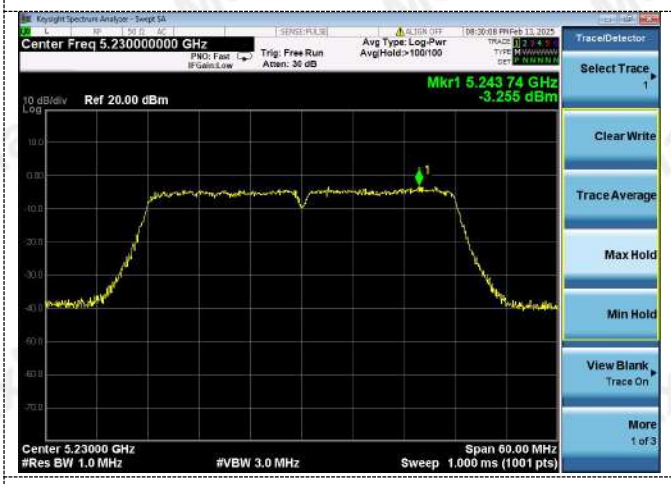
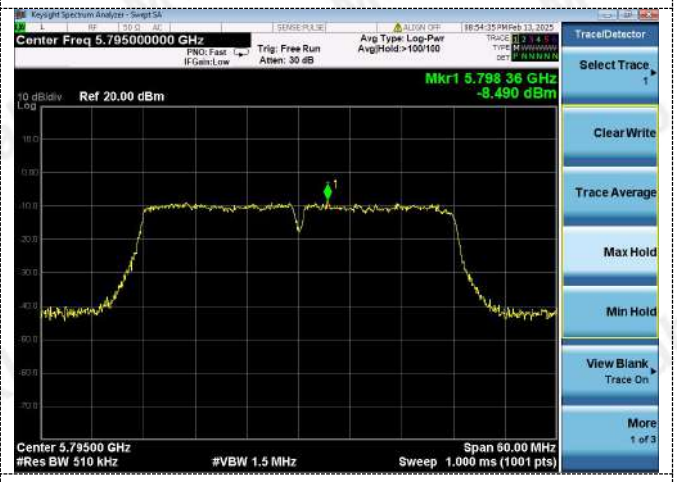
CH149

CH40

CH157

CH48

CH165

802.11n(HT40)	
U-NII 1	U-NII 3
	
CH38	CH151
	
CH46	CH159

802.11ac(HT20)

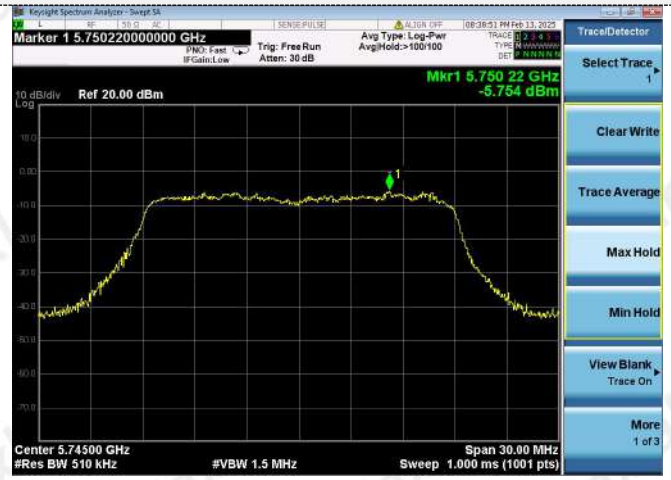
U-NII 1

CH36

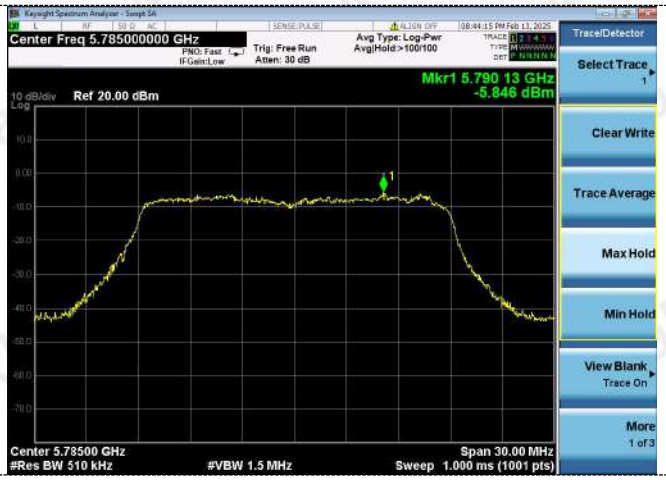
CH40

CH48

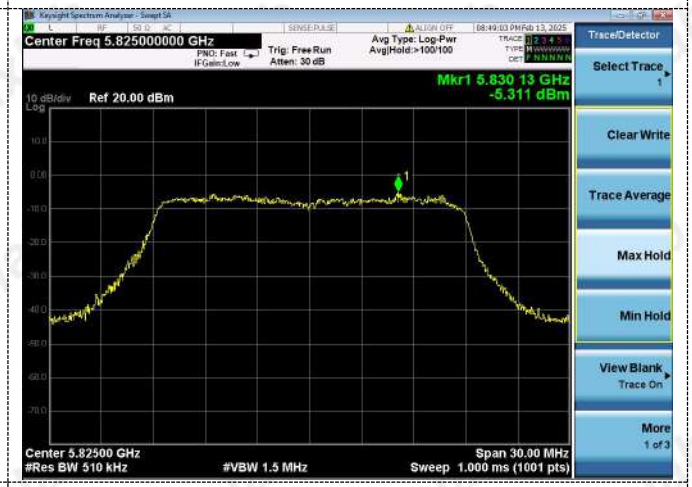
U-NII 3



CH149



CH157

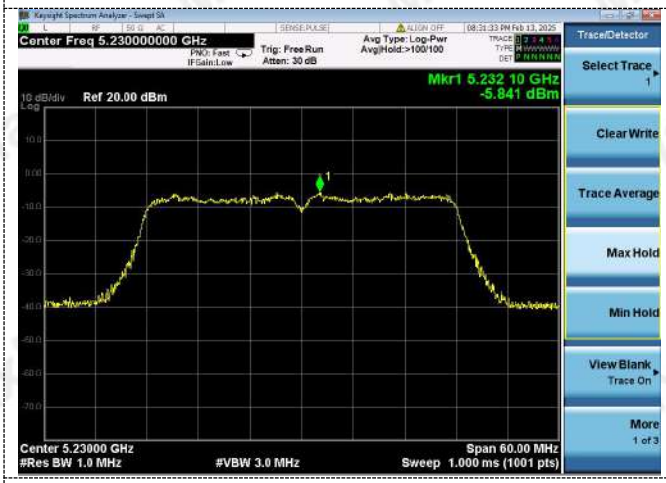


CH165

802.11ac(HT40)

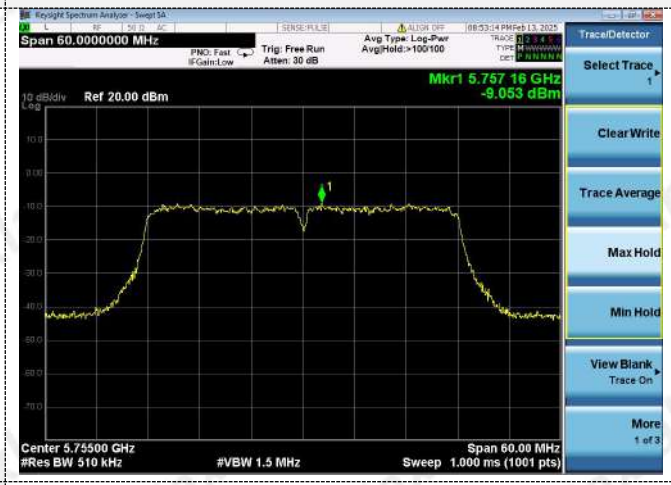
U-NII 1

CH38



CH46

U-NII 3

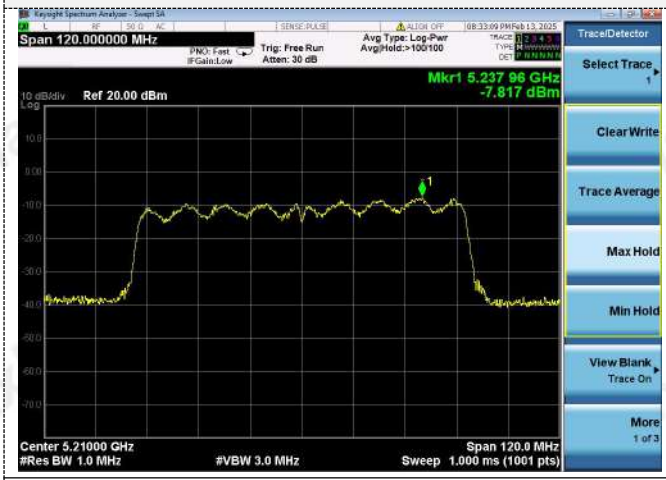


CH151

CH159

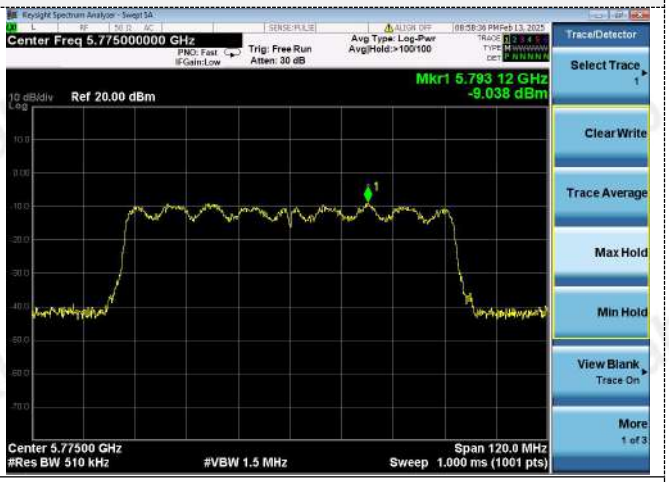
802.11ac(HT80)

U-NII 1



CH42

U-NII 3



CH155

4.5 Emission Bandwidth (26dBm Bandwidth)

Limit

N/A

Test Procedure

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW / EBW ratio is approximately 1 %.

Test Configuration

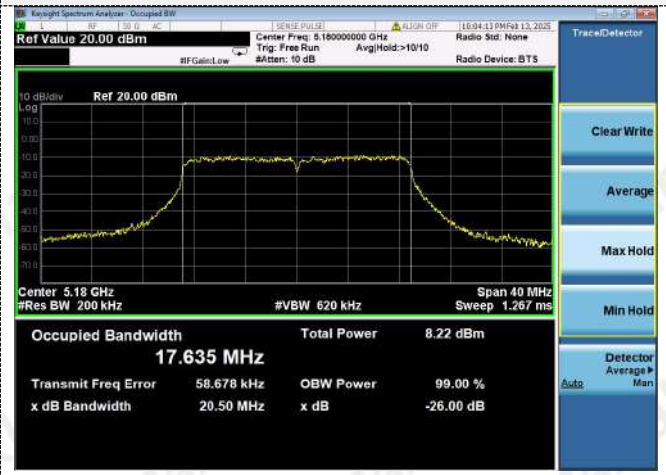
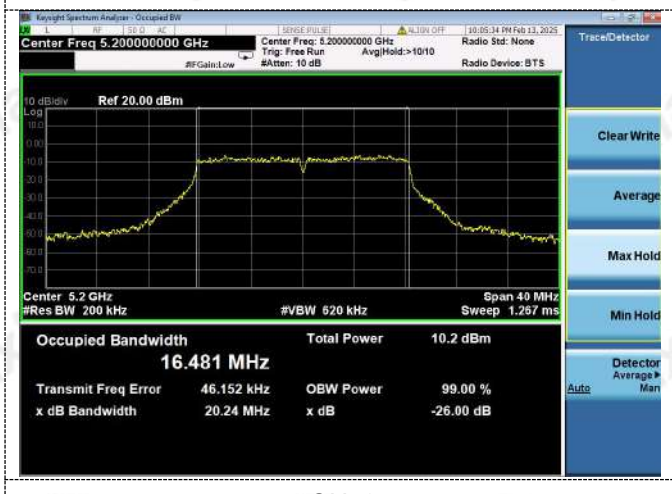
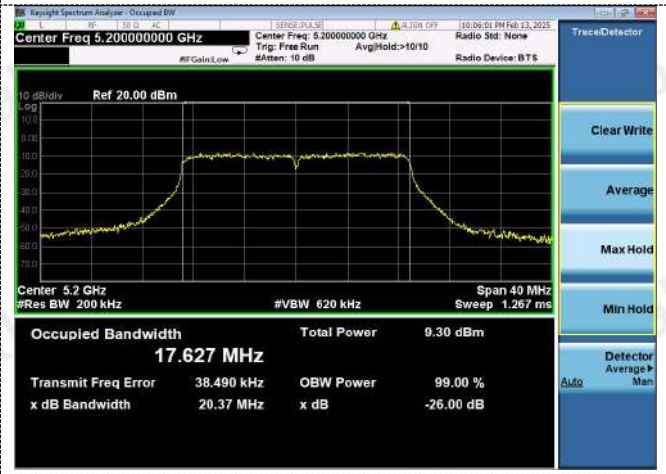
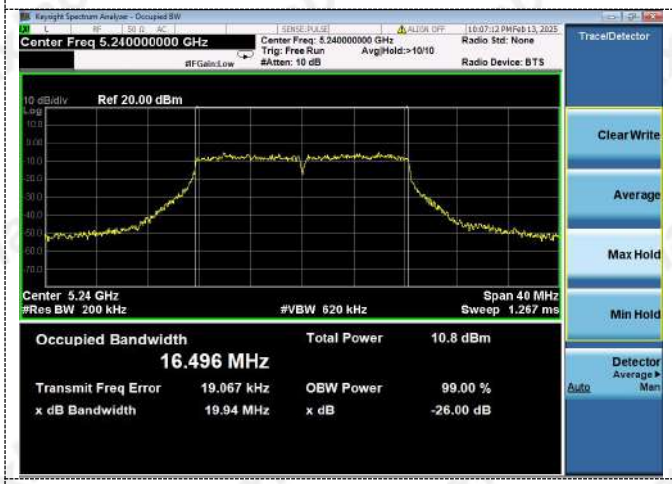
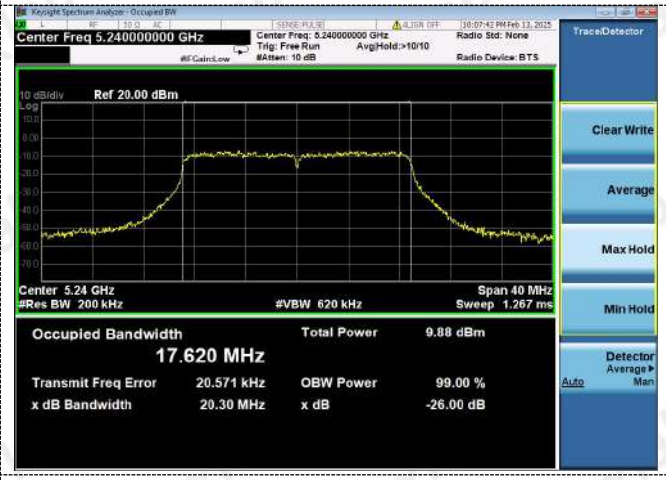
Test Results

Note: ANT A Power> ANT B Power, Both ANT A and B have been test, Only show the worst data of ANT A

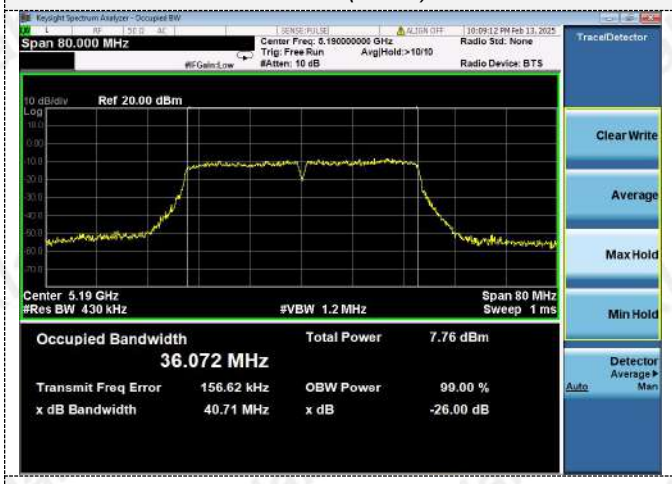
Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	20.23	N/A	Pass
		40	20.24		
		48	19.94		
802.11n(HT20)	U-NII 1	36	20.50		
		40	20.37		
		48	20.30		
802.11n(HT40)	U-NII 1	38	40.71		
		46	40.36		
802.11ac(HT20)	U-NII 1	36	20.65		
		40	20.55		
		48	20.33		
802.11ac(HT40)	U-NII 1	38	39.96		
		46	40.00		
802.11ac(HT80)	U-NII 1	42	81.03		

Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 3	149	20.15	N/A	Pass
		157	20.18		
		165	20.04		
802.11n(HT20)	U-NII 3	149	20.27		
		157	20.22		
		165	20.12		
802.11n(HT40)	U-NII 3	151	40.52		
		159	40.98		
802.11ac(HT20)	U-NII 3	149	20.36		
		157	20.19		
		165	20.17		
802.11ac(HT40)	U-NII 3	151	39.98		
		159	40.02		
802.11ac(HT80)	U-NII 3	155	81.87		

Test plot as follows:
U-NII 1 /5.2G

802.11a	*802.11n(HT20)*
	
CH36	*CH36*
	
CH40	*CH40*
	
CH48	*CH48*

802.11n(HT40)



CH38

CH46

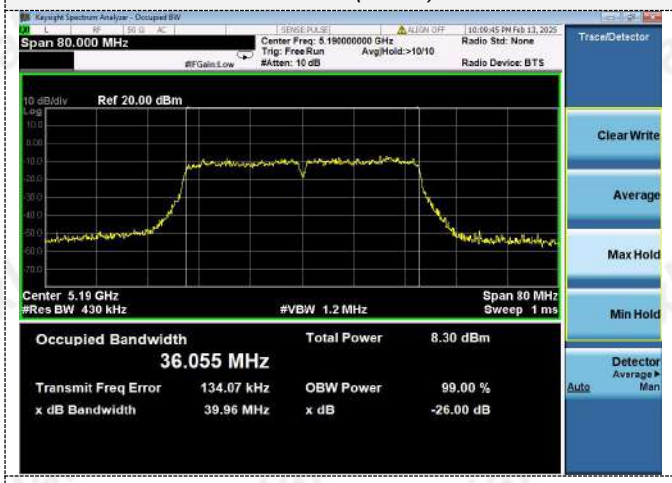
802.11ac(HT20)

CH36

CH40

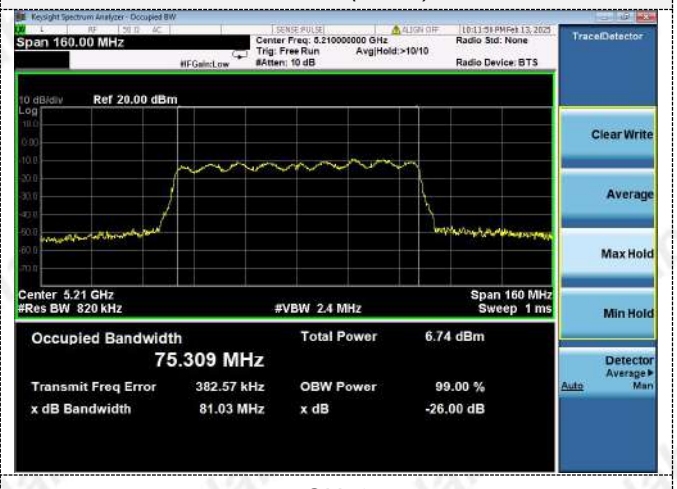
CH48

802.11ac(HT40)



CH38

802.11ac(HT80)

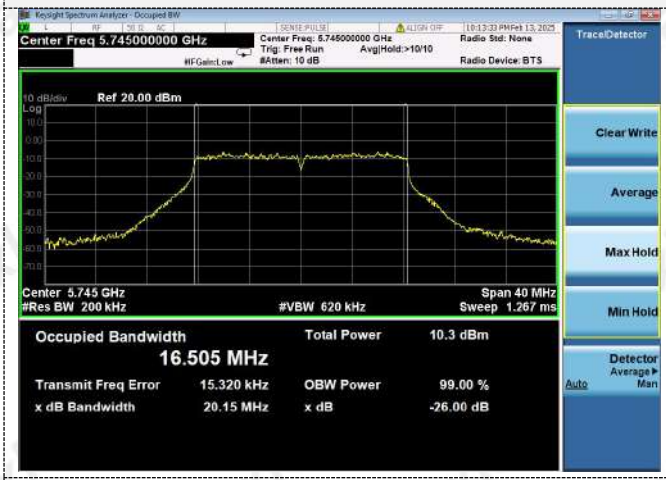


CH42

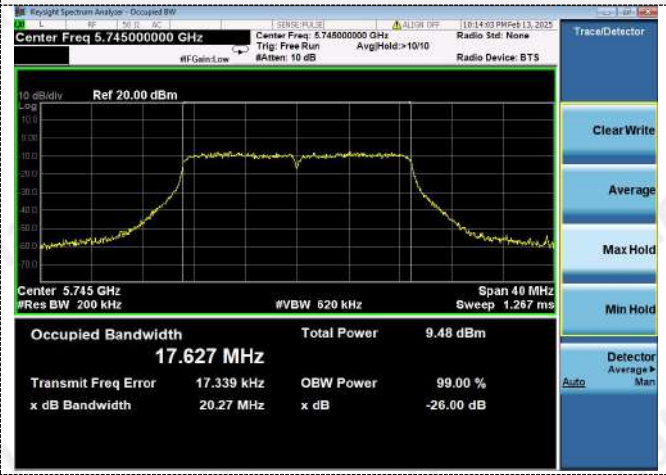
CH46

U-NII 3/ 5.8G

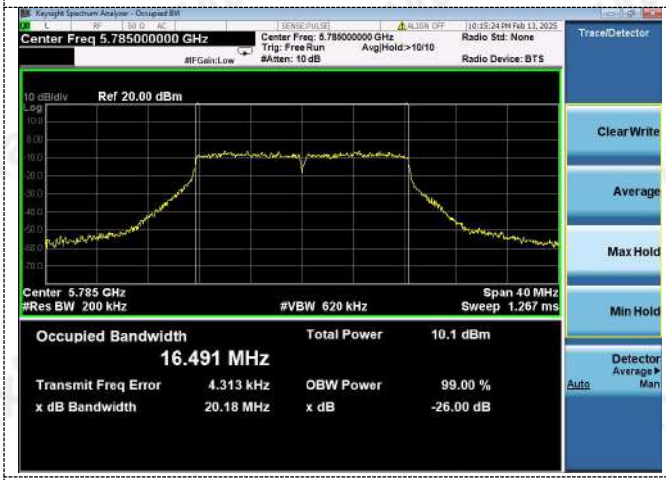
802.11a



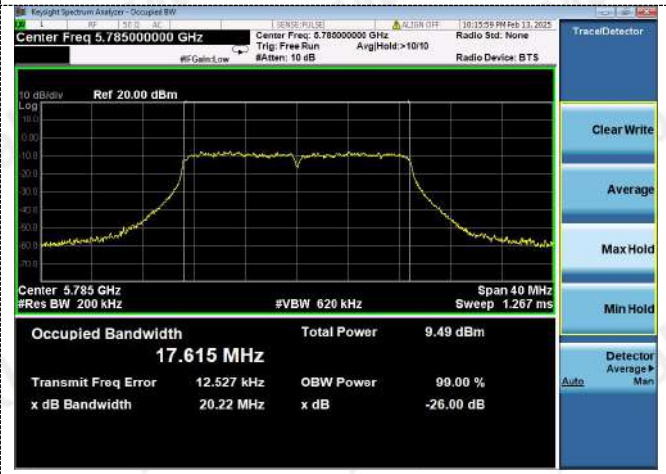
802.11n(HT20)



CH149

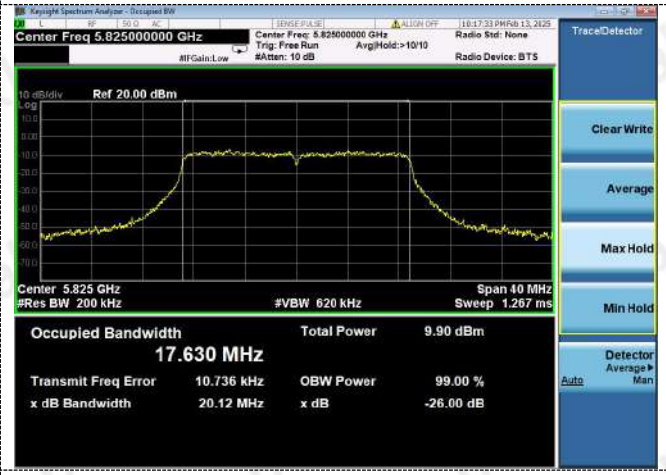


CH149



CH157

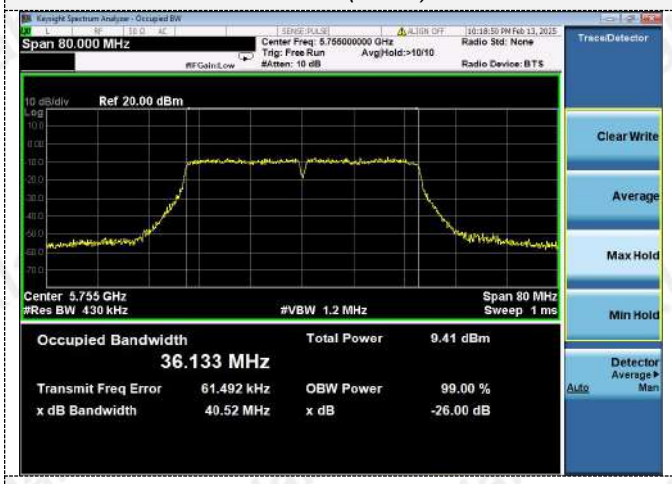
CH157



CH165

CH165

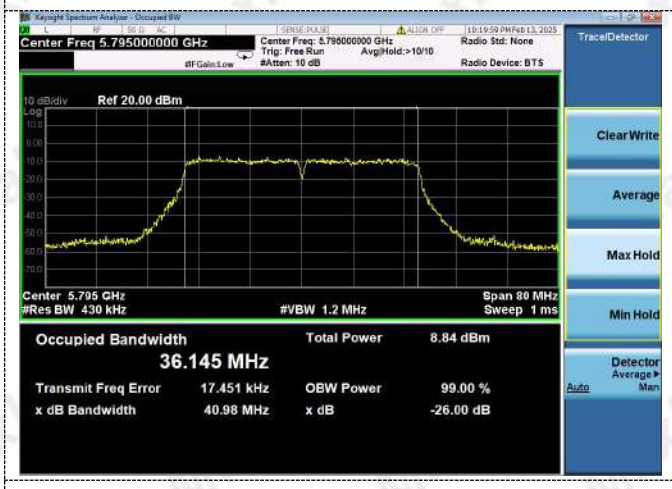
802.11n(HT40)



CH151

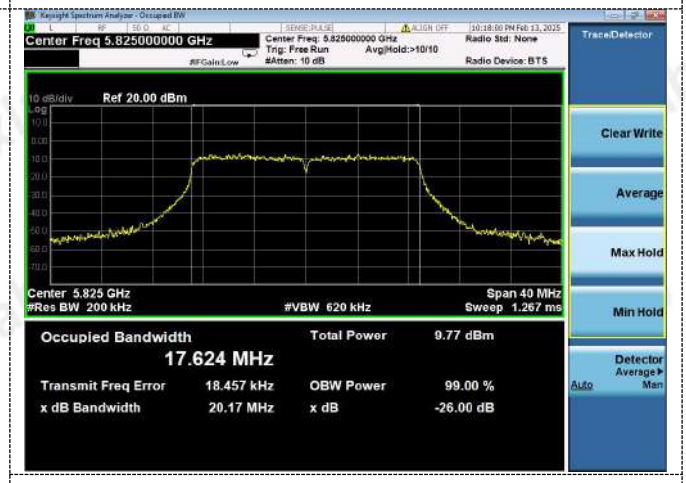
802.11ac(HT20)

CH149



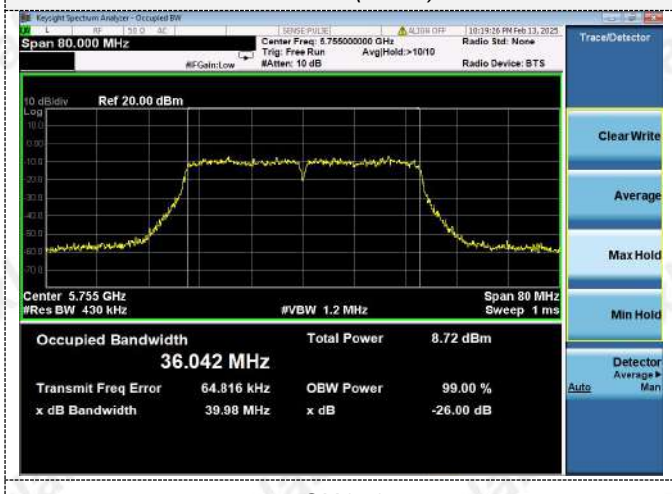
CH159

CH157



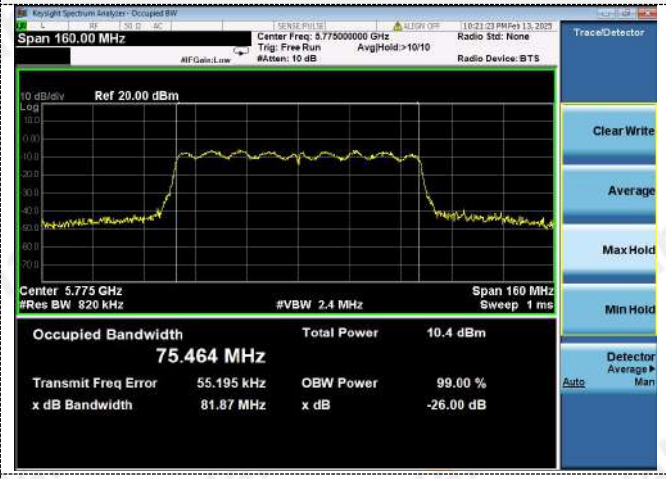
CH165

802.11ac(HT40)

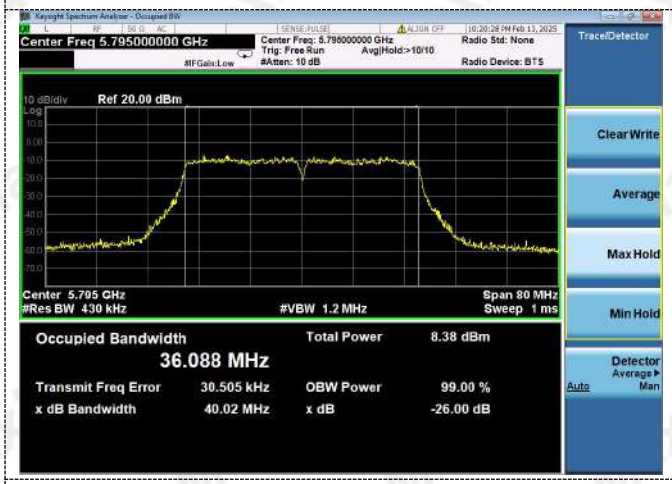


CH151

802.11ac(HT80)



CH155



CH159

4.6 Minimum Emission Bandwidth (6dBm Bandwidth)

Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

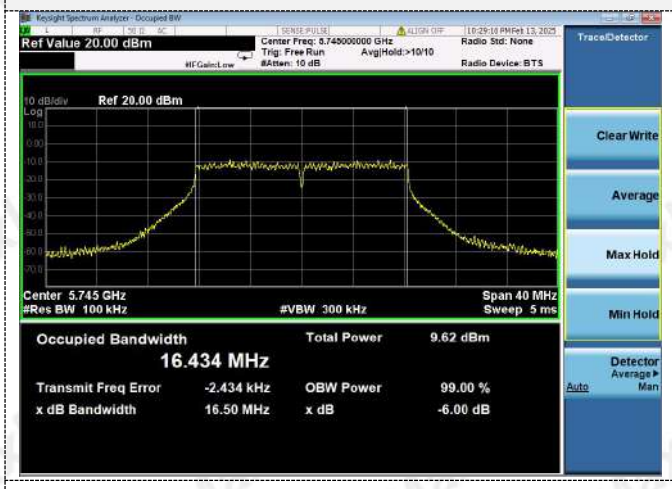
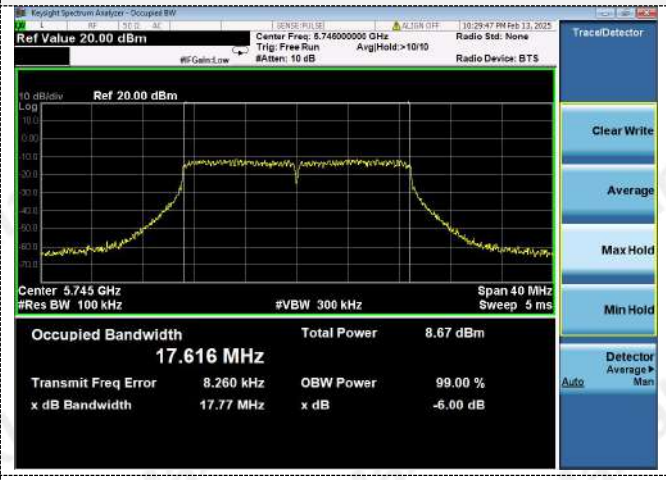
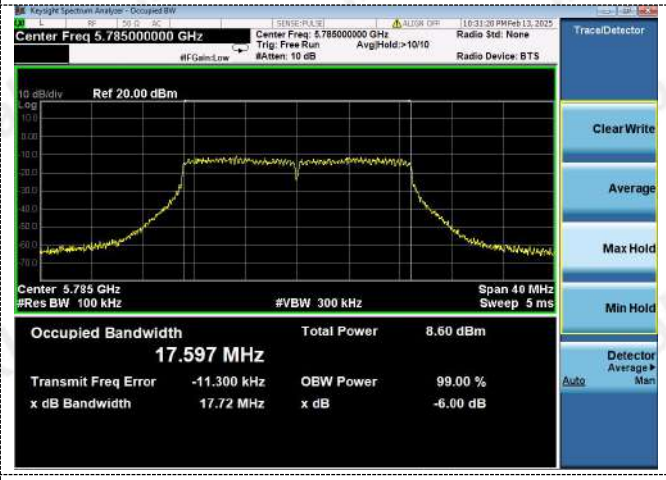
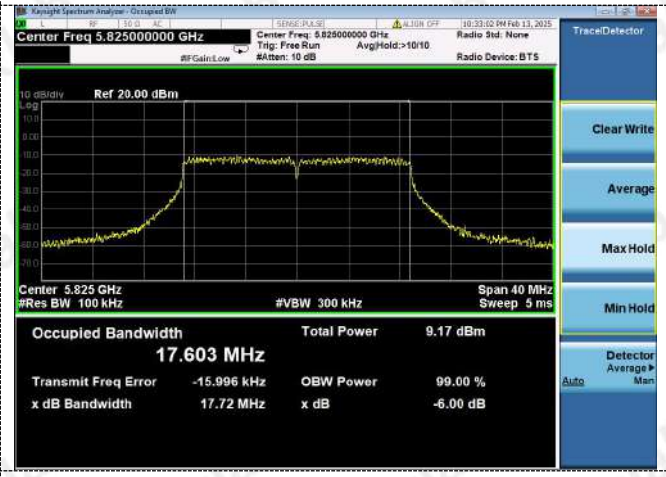
Test Configuration

Test Results

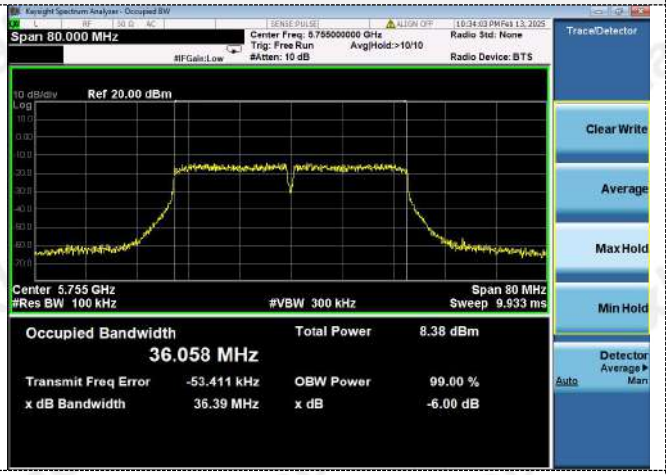
Note: ANT A Power> ANT B Power, Both ANT A and B have been test, Only show the worst data of ANT A

Type	Bands	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	U-NII 3	149	16.50	≥500KHz	Pass
		157	16.50		
		165	16.50		
802.11n(HT20)	U-NII 3	149	17.77		
		157	17.72		
		165	17.72		
802.11n(HT40)	U-NII 3	151	36.39		
		159	36.40		
802.11ac(HT20)	U-NII 3	149	17.77		
		157	17.72		
		165	17.74		
802.11ac(HT40)	U-NII 3	151	36.38		
		159	36.33		
802.11ac(HT80)	U-NII 3	155	76.37		

Test plot as follows:

802.11a	802.11n(HT20)
	
CH149	CH149
	
CH157	CH157
	
CH165	CH165

802.11n(HT40)

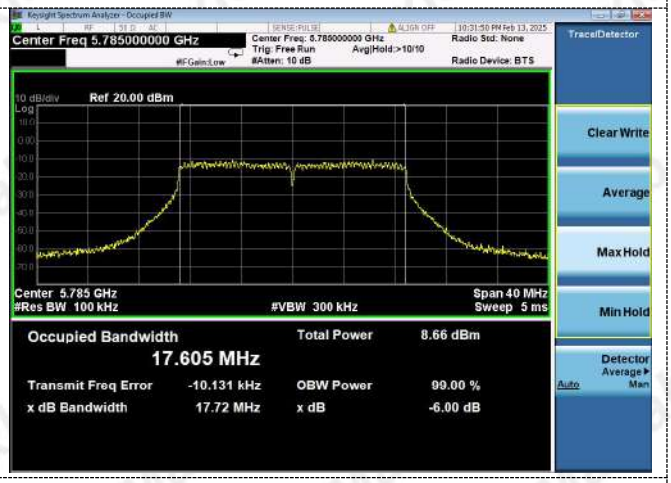


CH151

802.11ac(HT20)

CH149

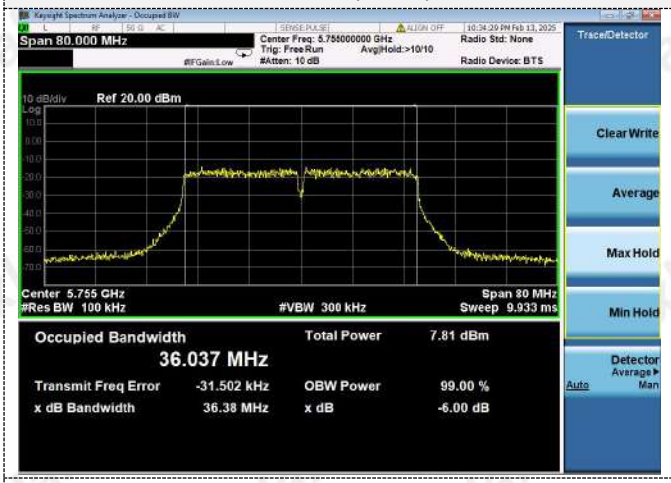
CH159



CH157

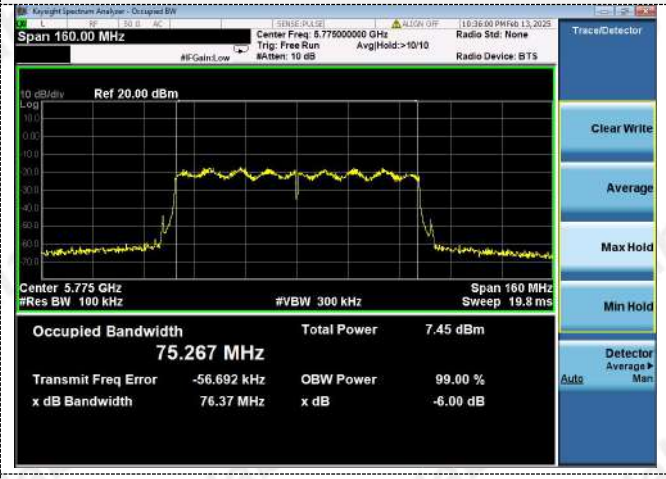
CH165

802.11ac(HT40)

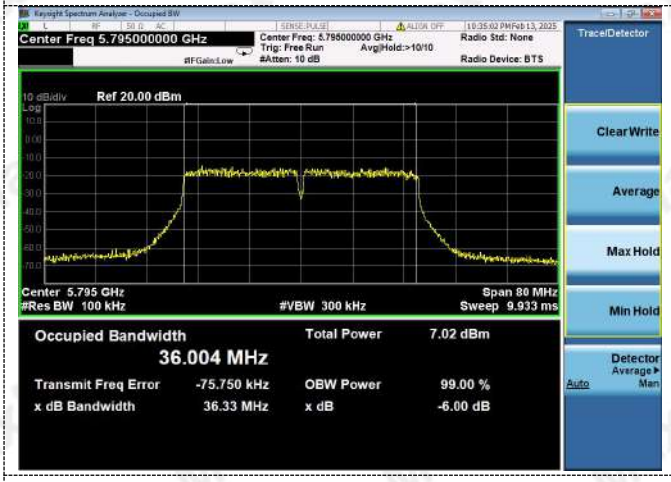


CH151

802.11ac(HT80)



CH155



CH159

4.7 Out of Band Emissions

4.7.1 Applicable Standard

According to FCC §15.407(b)
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

4.7.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

4.7.3 DEVIATION FROM STANDARD

No deviation.

4.7.4 TEST SETUP

4.7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

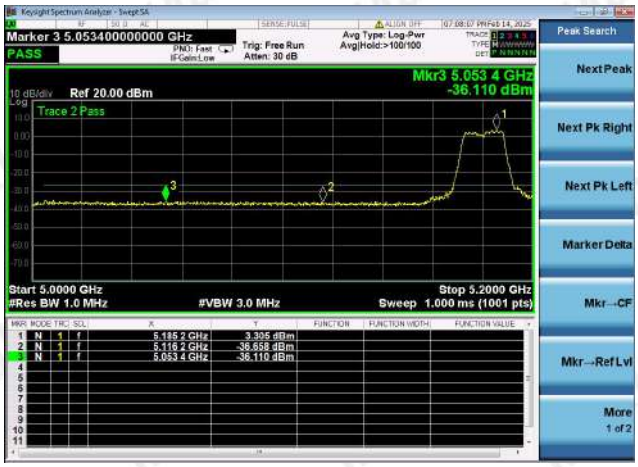
4.7.6 TEST RESULTS

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1012 hPa	Test Voltage :	AC 120V

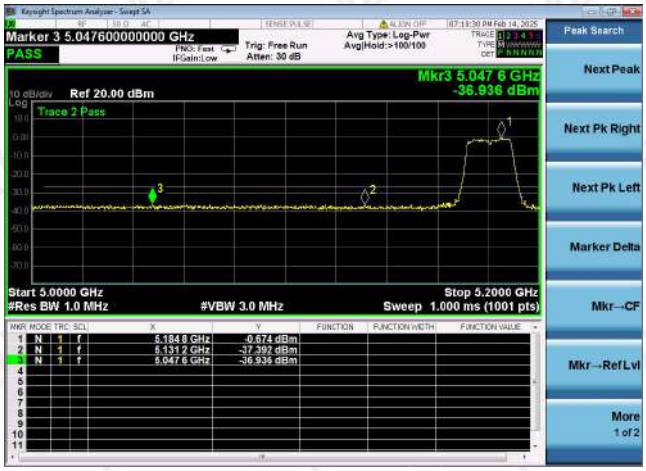
Note: ANT A Power> ANT B Power, Both ANT A and B have been test, Only show the worst data of ANT A

5.180~5.240 GHz

(802.11a) Band Edge, Left Side

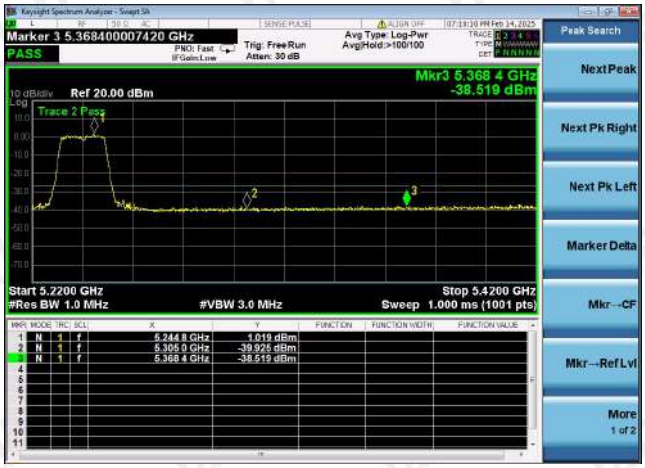


(802.11n20) Band Edge, Left Side



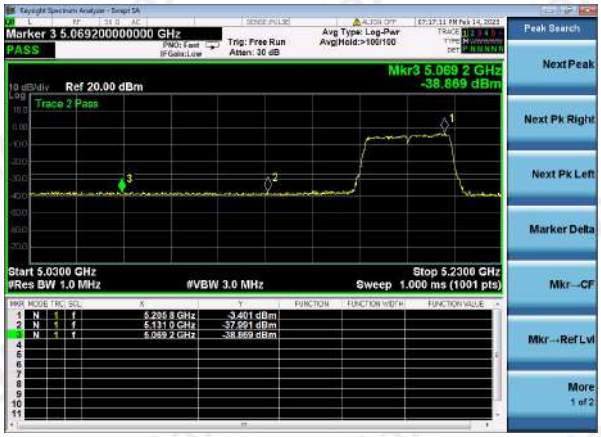
(802.11a) Band Edge, Right Side

(802.11n20) Band Edge, Right Side

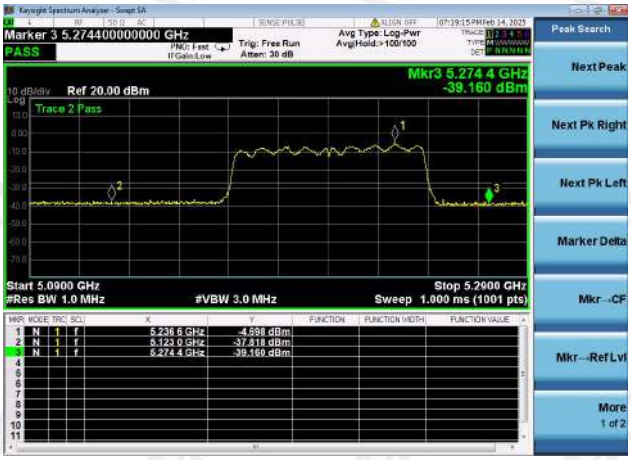


5.180~5.240 GHz

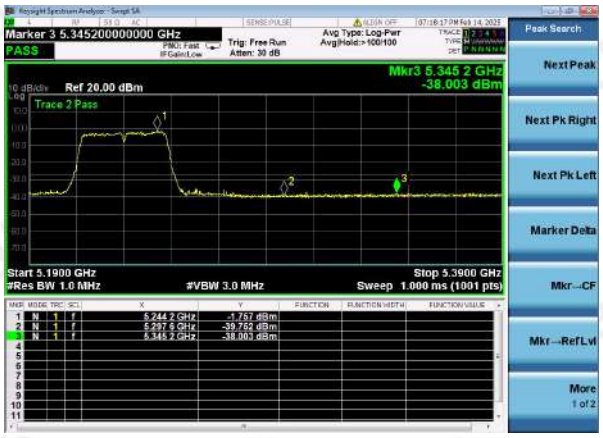
(802.11n40) Band Edge, Left Side



(802.11ac80) Band Edge

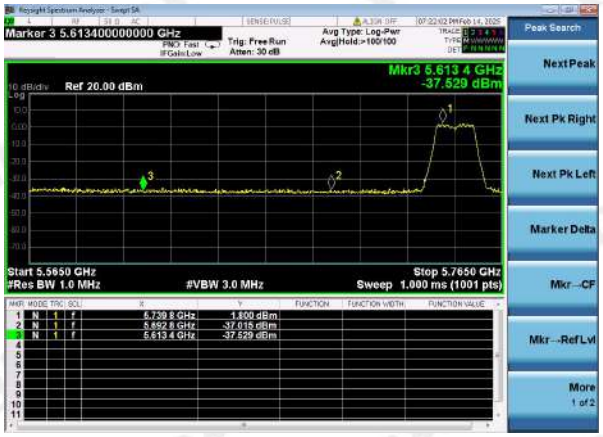


(802.11n40) Band Edge, Right Side

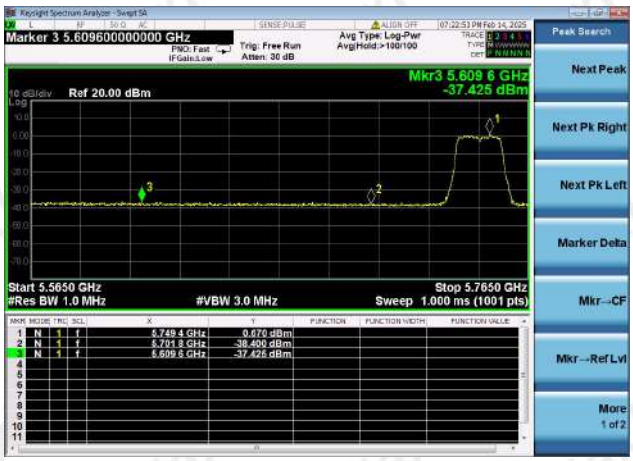


5.745~5.825 GHz

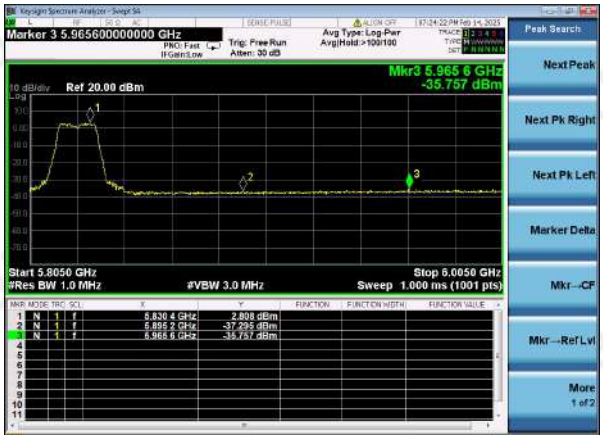
(802.11a) Band Edge, Left Side



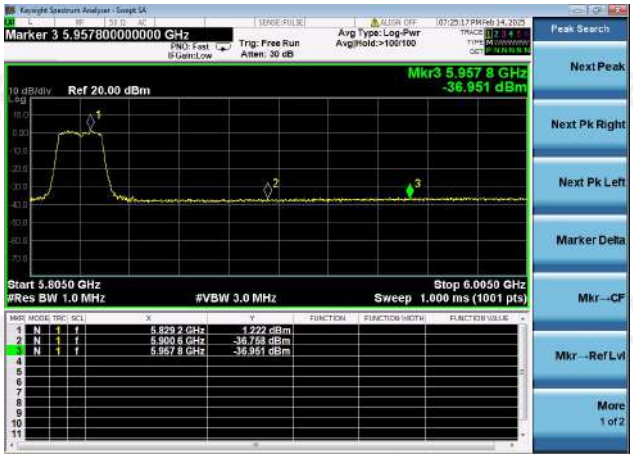
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side



(802.11n20) Band Edge, Right Side



(802.11a) & 802.11n20 Band Edge, Left Side

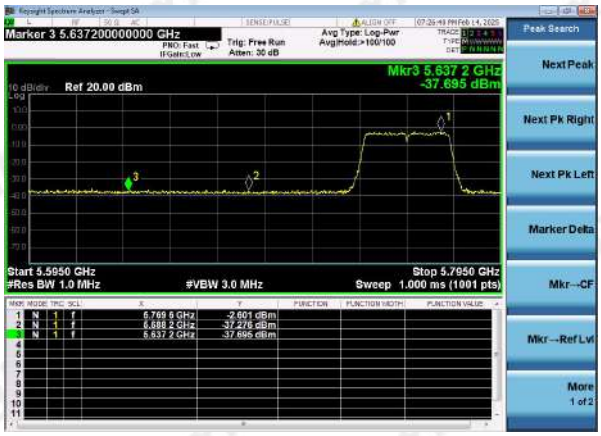
Frequency(GHz)	Limit (dbm)	Rate (dBm/MHz)	Test Results(dbm) 802.11a	Test Results(dbm) 802.11n20
5.5650~5.6500	-27	0	-37.529	-38.400
5.6500~5.7000	-27~10.6	15.6	-37.529	-38.400
5.7000~5.7200	10.6~15.6	10	-37.015	-37.425
5.7200~5.7250	15.6~27	27	-37.015	-37.425
5.7250~5.7650	27	0	1.800	0.670

(802.11a) & 802.11n20 Band Edge, Right Side

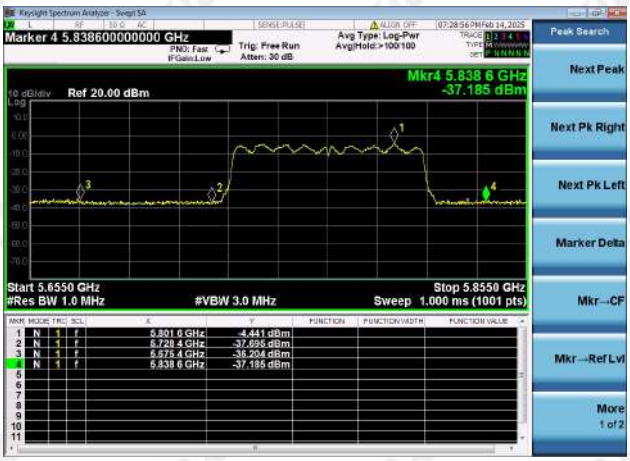
Frequency(GHz)	Limit (dbm)	Rate (dBm/MHz)	Test Results(dbm) 802.11a	Test Results(dbm) 802.11n20
5.8050~5.8500	27	0	2.808	1.222
5.8500~5.8550	27~15.6	27	-35.757	-36.758
5.8550~5.8750	15.6~10.6	10	-35.757	-36.758
5.8750~5.9250	10.6~-27	10.6	-37.295	-36.951
5.9250~6.0050	-27	0	-37.295	-36.951

5.745~5.825 GHz

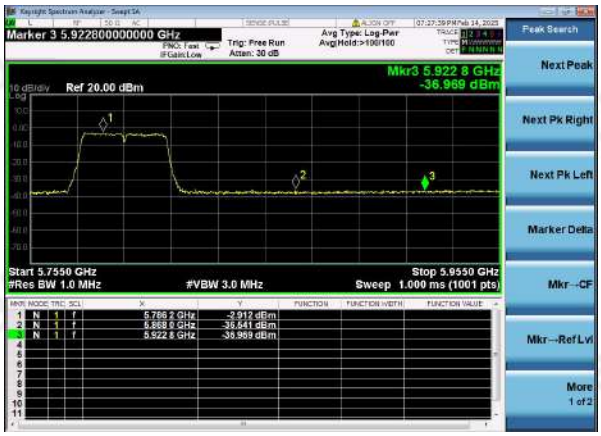
(802.11n40) Band Edge, Left Side



(802.11ac80) Band Edge



(802.11n40) Band Edge, Right Side



(802.11n40) Band Edge, Left Side

Frequency(GHz)	Limit (dbm)	Rate (dBm/MHz)	Test Results(dbm)
5.5950~5.6500	-27	0	-37.695
5.6500~5.7000	-27~10.6	15.6	-37.695
5.7000~5.7200	10.6~15.6	10	-37.276
5.7200~5.7250	15.6~27	27	-37.276
5.7250~5.7950	27	0	-2.601

(802.11n40) Band Edge, Right Side

Frequency(GHz)	Limit (dbm)	Rate (dBm/MHz)	Test Results(dbm)
5.7550~5.8500	27	0	-2.912
5.8500~5.8550	27~15.6	27	-36.541
5.8550~5.8750	15.6~10.6	10	-36.541
5.8750~5.9250	10.6~-27	10.6	-36.969
5.9250~5.9550	-27	0	-36.969

(802.11ac80) Band Edge

Frequency(GHz)	Limit (dbm)	Rate (dBm/MHz)	Test Results(dbm)
5.6500~5.7000	-27~10.6	15.6	-36.204
5.7000~5.7200	10.6~15.6	10	-36.204
5.7200~5.7250	15.6~27	27	-37.695
5.7250~5.8500	27	0	-4.441
5.8500~5.8550	27~15.6	27	-37.695

4.8 SPURIOUS RF CONDUCTED EMISSIONS

4.8.1 Conformance Limit

Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

4.8.2 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

4.8.3 Test Setup

4.8.4 Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2020 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=1MHz and VBW= 3MHz to measure the peak field strength, and measure frequency range from 30MHz to 40GHz.

4.8.5 Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

At 26.5GHz to 40GHz, the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

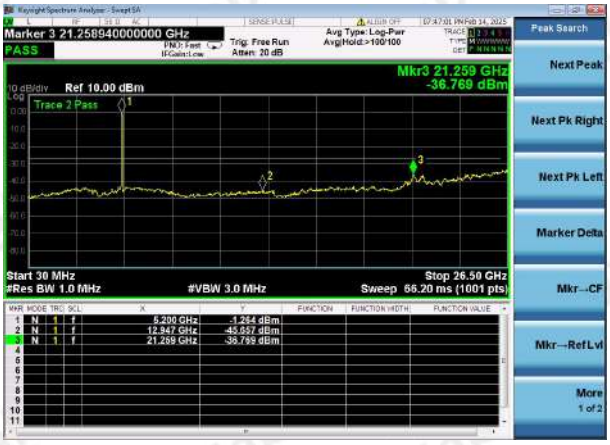
5.2G

Test Plot

802.11a on channel 36

802.11n20 on channel 36

802.11a on channel 40



802.11n20 on channel 40

802.11a on channel 48

802.11n20 on channel 48

Test Plot

802.11n40 on channel 38

802.11n40 on channel 46

802.11ac80 on channel 42

5.8G

Test Plot

802.11a on channel 149

802.11n20 on channel 149

802.11a on channel 157

802.11n20 on channel 157

802.11a on channel 165

802.11n20 on channel 165

Test Plot

802.11n40 on channel 151

802.11n40 on channel 159

802.11ac80 on channel 155

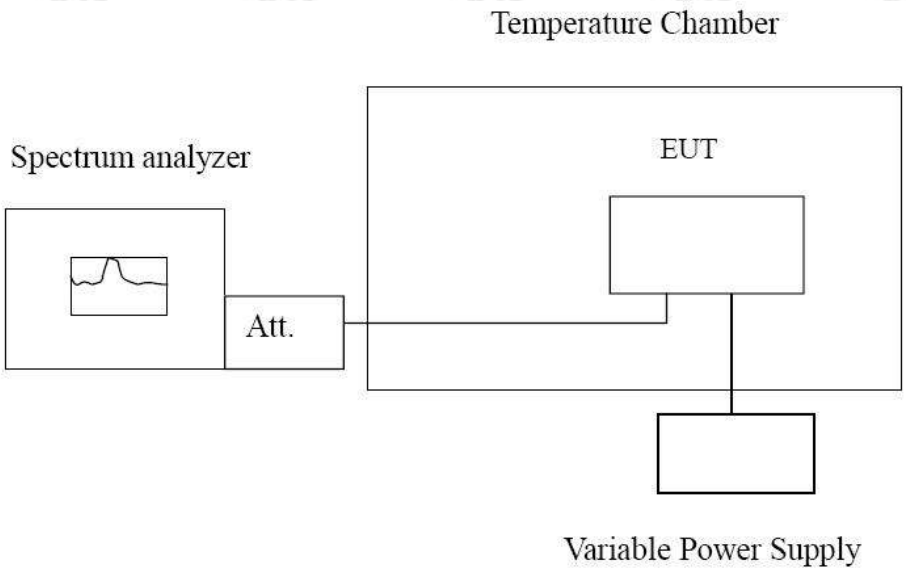
Frequency (GHz)	Limit (dbm)	Rate (dBm/MHz)	Test Results(dbm) 802.11a on channel 149	Test Results(dbm) 802.11n20 on channel 149
0.030~5.7650	/	/	-44.893	-44.612
5.5650~5.6500	-27	0	-44.893	-44.612
5.6500~5.7000	-27~10.6	15.6	-44.893	-44.612
5.7000~5.7200	10.6~15.6	10	-44.893	-44.612
5.7200~5.7250	15.6~27	27	-36.117	-36.671
5.7250~5.7650	27	0	-1.104	-1.117
5.7650~26.5	/	/	-36.117	-36.671
Frequency (GHz)	**Limit (dbm)**	**Rate (dBm/MHz)**	**Test Results(dbm) 802.11a on channel 157**	**Test Results(dbm) 802.11n20 on channel 157**
0.030~5.7550	/	/	-45.002	-45.702
5.7550~5.8500	27	0	-1.245	-0.890
5.8500~5.8550	27~15.6	27	-36.222	-36.827
5.8550~5.8750	15.6~10.6	10	-36.222	-36.827
5.8750~5.9250	10.6~-27	10.6	-36.222	-36.827
5.9250~5.9550	-27	0	-36.222	-36.827
5.9550~26.5	/	/	-36.222	-36.827
Frequency (GHz)	**Limit (dbm)**	**Rate (dBm/MHz)**	**Test Results(dbm) 802.11a on channel 165**	**Test Results(dbm) 802.11n20 on channel 165**
0.030~5.8050	/	/	-44.076	-45.014
5.8050~5.8500	27	0	0.142	-1.119
5.8500~5.8550	27~15.6	27	-35.557	-36.732
5.8550~5.8750	15.6~10.6	10	-35.557	-36.732
5.8750~5.9250	10.6~-27	10.6	-35.557	-36.732
5.9250~6.0050	-27	0	-35.557	-36.732
6.0050~26.5	/	/	-35.557	-36.732
Frequency (GHz)	**Limit (dbm)**	**Rate (dBm/MHz)**	**Test Results(dbm) 802.11n40 on channel 151**	**Test Results(dbm) 802.11n40 on channel 159**
0.030~5.7550	/	/	-44.457	-45.764
5.7550~5.8500	27	0	-2.330	-2.389
5.8500~5.8550	27~15.6	27	-36.897	-36.402
5.8550~5.8750	15.6~10.6	10	-36.897	-36.402
5.8750~5.9250	10.6~-27	10.6	-36.897	-36.402
5.9250~5.9550	-27	0	-36.897	-36.402
5.9550~26.5	/	/	-36.897	-36.402
Frequency (GHz)	**Limit (dbm)**	**Rate (dBm/MHz)**	**Test Results(dbm) 802.11ac80 on channel 155**	
0.030~5.6500	/	/	-36.048	
5.6500~5.7000	-27~10.6	15.6	-36.048	
5.7000~5.7200	10.6~15.6	10	-36.048	
5.7200~5.7250	15.6~27	27	-36.048	
5.7250~5.8500	27	0	-4.481	
5.8500~5.8550	27~15.6	27	-45.132	
5.8550~26.5	/	/	-45.132	

4.9 Frequency Stability

Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

TEST CONFIGURATION



TEST PROCEDURE

Frequency Stability under Temperature Variations:
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:
Set chamber temperature to 25℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

Reference Frequency: 802.11ac channel=36 frequency=5180MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
120.00	-30	67.71	0.013	Within the band of operation	Pass
	-20	81.35	0.016		
	-10	104.13	0.020		
	0	82.95	0.016		
	10	93.44	0.018		
	20	48.27	0.009		
	30	71.92	0.014		
	40	77.52	0.015		
	50	82.22	0.016		
138.00	25	97.84	0.019		
102.00	25	54.38	0.010		

Reference Frequency: 802.11ac channel=149 frequency=5745MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
120.00	-30	108.22	0.019	Within the band of operation	Pass
	-20	89.51	0.016		
	-10	49.27	0.009		
	0	62.58	0.011		
	10	56.98	0.010		
	20	51.16	0.009		
	30	52.57	0.009		
	40	84.92	0.015		
	50	109.91	0.019		
138.00	25	54.60	0.010		
102.00	25	53.89	0.009		

4.10 Antenna Requiremen

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

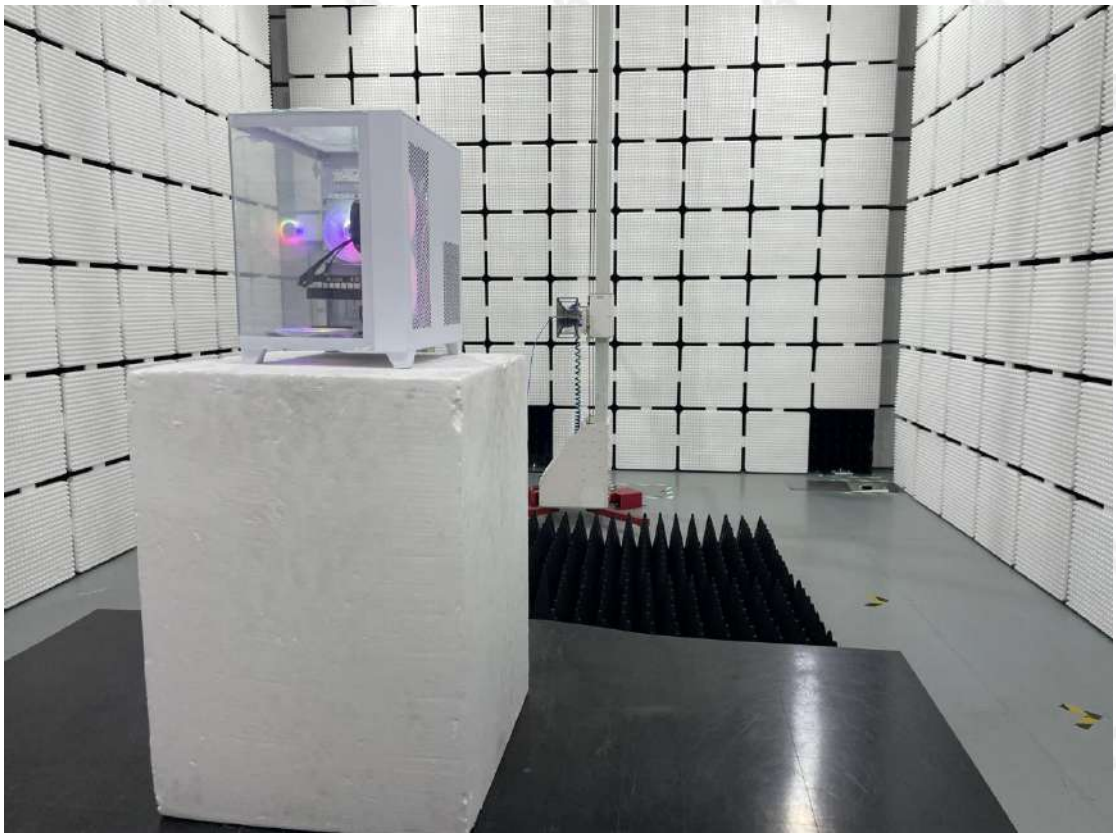
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

Test Result:

The EUT has two external antenna (Antenna A gain: 5.0 dBi, Antenna B gain: 5.0 dBi). It comply with the standard requirement.

Remark:The antenna gain is provided by the customer, if the data provided by the customer is not accurate, MAXLAB Testing Co.,Ltd. does not assume any responsibility.

5 Test Setup Photos of the EUT



6 Photos of the EUT

Reference to the report ANNEX A of external photos and ANNEX B of internal photos.

********** **End of Report** **********